

Waiver

Exam Guide

Table of Contents

Introduction	3
Accounting (ACCT 611)	
Sample Placement Exam	6
Sample Waiver Exam–Part 1	19
Sample Waiver Exam–Part 2	32
Sample Placement Exam Answers	50
Sample Waiver Exam–Part 1 Answers	57
Sample Waiver Exam–Part 2 Answers	61
Corporate Finance (FNCE 611/612)	
Placement/Waiver Exam–Part 1	66
Placement/Waiver Exam–Part 2	71
Placement/Waiver Exam–Part 1 Answers	77
Placement/Waiver Exam–Part 2 Answers	81
Macroeconomics and the Global Economic Environment (FNCE 613)	
Sample Exam 1	87
Sample Exam 2	97
Sample Exam 1 Answers	103
Sample Exam 2 Answers	108
Economics of Managerial Decision Making (MGEC 611)	
Sample Exam	112
Sample Exam Answers	118
Economics of Managerial Decision Making (MGEC 612)	
Sample Exam	127
Sample Exam Answers	134
Operations Management: Quality and Productivity (OPIM 611)	
Final Exam	139
Final Exam Answers	155
Regression Analysis for Business (STAT 613)	
Sample Exam	160
Sample Exam Answers	176

Introduction

Prior to Pre-Term, various academic departments will administer waiver and placement exams for the following courses:

- ACCT 611/613 Financial & Managerial Accounting
 - Placement: ACCT 612 Accelerated Financial Accounting
- FNCE 611 Corporate Finance
 - Placement: FNCE 612 Accelerated Corporate Finance
- FNCE 613 Macroeconomics and the Global Economic Environment
- MGEC 611 Microeconomics for Managers: Foundations
- MGEC 612 Microeconomics for Managers: Advanced Applications
- OPIM 611 Managing the Productive Core of the Firm: Quality and Productivity
- STAT 613 Regression Analysis for Business
 - Placement: STAT 621: Accelerated Regression Analysis for Business

The dates and times are listed on page 5.

To help you determine if you can realistically pass the exam, each department has provided a sample set of questions similar to those you may encounter during the waiver exam. Use these questions to determine whether or not you are qualified to take the waiver exam and also to study.

■ Prep Coursework for ACCT, FNCE, and STAT

WEDNESDAY, JULY 29 – FRIDAY, JULY 31

(Please note that these classes take place before the start of Pre-Term.)

These ACCT, FNCE, and STAT classes are the only classroom review offered for waivers. Attendance is not required to take the waiver and placement exams but highly recommended.

ACCT 604: This course is meant for students seeking placement into ACCT 612. ACCT 604 is meant to help qualified students who may need to refresh their knowledge of basic financial accounting concepts. It is not designed for students with little or no previous exposure to accounting.

ACCT 608: This course is designed for students who may be able to waive entirely the accounting requirement but need to refresh their understanding of graduate-level financial accounting concepts. This course is not designed for students with little or no previous exposure to accounting.

FNCE 604: This course is designed for students seeking placement into FNCE 612. FNCE 604 is meant to help qualified students who may need to refresh their knowledge of basic corporate finance concepts. It is not designed for students with little or no previous exposure to corporate finance.

STAT 608: This course is designed for students who wish to review the prerequisite materials for STAT 621 to prepare for the placement exam. It is not designed for students with little or no previous exposure to statistics.

■ Waiver Policies

- There are two deadlines for submitting waiver by credential:
 - **Monday, June 1** – results will be returned by Monday, June 15
 - **Monday, July 6** – results will be returned by Monday, July 20

We encourage you to submit your credentials as soon as possible in order to determine if you will need to take the waiver prep courses and exams that take place before Pre-Term. **Credentials will not be accepted after the July 6 deadline.**
- All waiver exams must be completed by **Tuesday, August 4, 2015.**
- To waive by credential, you must meet the stated deadlines. **No credentials will be accepted after Monday, July 6.**
- If you do not meet the requirements to waive a course by credential, you may try to waive the same course by taking the waiver exam in all subjects that offer a waiver by exam, except OPIM 611. For OPIM 611, you can only take the waiver exam if that is recommended.
- You have only one attempt at each waiver exam and are eligible to take them only in the summer preceding your first year. If you are unable to waive a core course by credential and cannot take the waiver exam at the scheduled time, you must take the course.
- There are no make-up waiver exams.
- If the online waiver questionnaire does not recommend you attempt to waive by credential, you may not submit credentials. If you still wish to waive the course, the only way to do so is by taking and passing the waiver exam.
- Students granted waivers for fixed Core courses may still choose to enroll in said courses provided they enroll prior to the close of the add period. To enroll in a waived course, students should contact their academic advisor in the MBA Program Office.

You can register for the exams online using the SPIKE Waiver Registration page at <https://spike.wharton.upenn.edu/mbaprogram/index.cfm>.

Waiver and Placement Exam Schedule 2015 (subject to change)
Monday, August 3 and Tuesday, August 4

Course ID	Course Title	Day	Date	Time
ACCT 611/612	Accounting (Waiver and Placement Exams)	Mon	3-Aug	5:00 - 7:00 p.m.
FNCE 611/612	Corporate Finance	Mon	3-Aug	8:30 - 11:30 a.m. [†]
FNCE 613	Macroeconomics and the Global Economic Environment	Mon	3-Aug	2:30 - 4:30 p.m.*
MGEC 611	Microeconomics for Managers: Foundations	Tues	4-Aug	8:30 - 10:00 a.m.
MGEC 612	Microeconomics for Managers: Advanced Applications	Tues	4-Aug	10:15 - 11:30 a.m.
OPIM 611	Managing the Productive Core of the Firm: Quality and Productivity	Mon	3-Aug	12:00 - 2:00 p.m.
STAT 613	Regression Analysis for Managers	Tues	4-Aug	12:00 - 2:00 p.m.

[†]Students who score sufficiently well on the FNCE 611 waiver exam are granted waivers for FNCE 611, FNCE 612, and FNCE 614.

*Students who score sufficiently well on FNCE 613 waiver exam will be granted waivers for both FNCE 613 and FNCE 615.

Accounting ACCT611

SAMPLE PLACEMENT EXAM

NOTE: This exam reflects coursework for the first 3-4 weeks of ACCT611 and is a good example of the knowledge needed to place into ACCT612.

NAME

(Print)

PENN ID NUMBER

(10 middle digits)

■ Instructions

1. This is a 132 point exam. Budget your time to achieve maximum points.
2. Answer the problems only in the space indicated. Answers placed elsewhere will not be graded. Present your work in an orderly fashion to facilitate the awarding of partial credit. Partial credit can only be given for answers that are presented in a manner which is clear, logical, and easily read.
3. There are 18 numbered pages in this booklet. Make sure that you have all of the pages.
4. The exam is closed book. You are only allowed one 8.5 x 11 inch paper for notes.
5. Please print your name in the space provided on the first page and on all subsequent pages if you take the exam apart.
6. Hand in the entire exam when you are done.

Question	Points Assigned	Points Scored
Question 1	78	
Question 2	54	
Total	132	

QUESTION I (78 pts)

Baiman-Carter Incorporated (BCI) released preliminary financial statements (balance sheet, income statement, and statement of cash flows) in a press release. Subsequent to the release, the company announced that it would have to restate those financial statements because of transactions that the bookkeeper had neglected to record or had recorded incorrectly. Wayne Guay, principal of Guay Capital, has asked you to indicate the effects these errors. In particular, for each transaction, record the transaction to correct the error or omission and indicate the effect on all line items in the Indirect Statement of Cash Flows and the section in which these changes would appear (i.e. operating, investing or financing). Treat each transaction as independent. Wayne did the first transaction as an example.

Example: Services of \$5,000 were provided during the period at an expense (all cash) of \$1,000, but BCI has not yet been paid for the services. The bookkeeper didn't record these.

Event/Transactions		Statement of Cash Flows	
Dr. Accounts Receivable	5,000	Net Income	+4,000
Cr. Revenue	5,000	- ↑ Accts Rec.	<u>-5,000</u>
Dr. Operating Expense	1,000		
Cr. Cash	1,000	CFO	-1,000
		CFI	0
		CFF	0

1. (6 pts) The company paid cash for next year's insurance coverage (\$2,000) on the last day of the accounting period. The bookkeeper never recorded this.

Event/Transactions		Statement of Cash Flows	
		NI	
		CFO	
		CFI	
		CFF	

2. (6 pts) During the year, \$3,000 of prepaid advertisements ran in the local newspaper. The book-keeper recorded the original payment correctly but no other transactions related to this.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

3. (6 pts) The bookkeeper recorded \$1,000 of amortization expense during the year. However, that amount should have been \$5,000 not \$1,000.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

4. (6 pts) Dividends of \$5,000 were declared and paid on the last day of the year. The bookkeeper never recorded this.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

5. (6 pts) The company has debt outstanding, with interest expense of \$4,000 per year. The interest was incurred this year but will be paid next year. The bookkeeper never recorded this.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

6. (6 pts) The company purchased, for cash, \$10,000 worth of PP&E on the last day of the year. The bookkeeper mistakenly recorded it as \$1,000.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

7. (6 pts) A new customer placed an order for \$3,000 of widgets whose historical cost on BCI's books was \$2,000. The customer has not yet paid for the order. This order was not shipped at year end. However, the bookkeeper recorded it as a sale transaction during the year.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

8. (6 pts) Because of an unexpected windfall of cash, the company repaid \$8,000 of long-term debt on the last day of the year. The bookkeeper never recorded this event.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

9. (6 pts) The company has a multistage project with a customer that is accounted for using the percentage-of-completion method. In the prior year, the customer paid a \$9,000 deposit (total revenues for the project are \$9,000). During the year, the company delivered 1/3 of the project to the customer incurring costs of \$1,000 in cash (total costs for the project are \$3,000). The bookkeeper recorded only the receipt of the deposit and not any other transactions related to this project.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

10. (6 pts) The company issued shares for \$5,000 cash. The bookkeeper mistakenly recorded this transaction as a \$50,000 increase in owners' equity.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

11. (6 pts) The company incurred \$7,000 of administrative expenses, of which \$3,000 were paid by year end. The bookkeeper never recorded these transactions.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

- 12.** (6 pts) A customer paid a deposit of \$8,000 for an order to be delivered next year. The company acquired \$2,000 of inventory on account to begin producing widgets. The bookkeeper never recorded these transactions.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

- 13.** (6 pts) The bookkeeper salary earned for the last month of the year was \$10,000. The company will pay the bookkeeper this \$10,000 in the next period.

Event/Transactions	Statement of Cash Flows
	NI
	CFO
	CFI
	CFF

QUESTION II (54 pts)

Callaway Golf Company designs, manufactures and sells high quality golf clubs and golf balls. The Company also sells golf accessories such as footwear, golf bags, golf gloves, golf headwear, golf towels and golf umbrellas. The Company's products are sold in the United States and in over 100 countries around the world. Refer to the Income Statement, Balance Sheet and Statement of Cash Flows for Callaway which are located on the last three pages of this exam booklet. Please answer the following questions.

Required

1. (4 pts) In which year (among those reported) did Callaway raise the most cash from financing activities?

2. (4 pts) If Callaway had not paid any dividends in 2003, 2004 and 2005, how much more cash from financing activities would have been raised over this three-year period?

3. (4 pts) What was the net book value of long-lived assets sold during 2005?

4. (4 pts) If Callaway had not sold any long-lived assets in 2005, how much would cash from investing activities have changed?

Answer _____

(circle one) HIGHER LOWER NO CHANGE

5. (4 pts) If Callaway had not sold any long-lived assets in 2005, how much would cash from operating activities have changed?

Answer _____

(circle one) HIGHER LOWER NO CHANGE

6. (6 pts) Callaway recognizes warranty expenses as a component of Selling Expenses on the income statement. Assume that Callaway's total costs (cash, replacement equipment, etc) in 2005 to satisfy customers who returned broken golf equipment under warranty was \$15,000 thousands (i.e., \$15 million). How much warranty expense was included in Selling Expenses by Callaway in their income statement during 2005?

7. (4 pts) Provide the entries that reconcile the Retained Earnings T-account between December 31, 2004 and December 31, 2005. Include descriptive titles and amounts for each entry. All dividends declared have been paid by the end of 2005.

Retained Earnings		
	Beginning Balance	\$437,269
	Ending Balance	\$430,996

8. (4 pts) In 2005, Callaway recognized and paid \$26,989 in research and development expenses. All of the research was done internally by Callaway. Which section of the Statement of Cash Flows is affected by these expenditures?
9. (5 pts) Assume that all of Callaway's 2005 revenues were cash sales. How much cash did Callaway collect from its customers in 2005?
10. (5 pts) Now ignore Part 9 above and instead assume that 50% of Callaway's 2005 revenues were cash sales, and the other 50% on account. How much cash would Callaway have collected from its customers in 2005?
11. (4 pts) Provide the journal entry to record Callaway's capital expenditures made in cash in 2005. Assume there were no capital expenditures through acquisitions. Include the account titles and amounts. Make as many entries as necessary.
- Debit _____
- Credit _____
- Debit _____
- Credit _____
12. (6 pts) Assume that all of Callaway's inventory costs are paid in cash except for raw materials that are bought on account from suppliers (also assume that Accounts Payable reflect only raw material purchases). How much cash did Callaway spend on inventory costs in 2005?

CALLAWAY GOLF COMPANY
CONSOLIDATED BALANCE SHEETS
(In thousands, except share and per share data)

	DECEMBER 31,	
	2005	2004
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 49,481	\$ 31,657
Accounts receivable, net	98,082	100,378
Inventories, net	241,577	175,982
Deferred taxes	38,192	32,959
Income taxes receivable	2,026	28,697
Other current assets	9,232	14,036
Total current assets	438,590	393,732
Property, plant and equipment, net	127,739	135,865
Intangible assets, net	146,123	159,191
Goodwill	29,068	30,468
Deferred taxes	6,516	9,837
Other assets	16,462	16,667
	<u>\$ 764,498</u>	<u>\$ 735,737</u>
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 102,134	\$ 69,394
Accrued employee compensation and benefits	24,783	26,322
Warranty liability	13,267	12,043
Bank line of credit	—	13,000
Capital leases, current portion	21	39
Total current liabilities	140,205	120,798
Long-term liabilities:		
Deferred compensation	8,323	8,674
Energy derivative valuation account	19,922	19,922
Capital leases, net of current portion	—	26
Commitments and contingencies (Note 13)		
Shareholders' equity:		
Preferred Stock, \$.01 par value, 3,000,000 shares authorized, none issued and outstanding at December 31, 2005 and 2004	—	—
Common Stock, \$.01 par value, 240,000,000 shares authorized, 84,950,694 shares and 84,785,694 shares issued at December 31, 2005 and 2004, respectively	850	848
Additional paid-in capital	393,676	387,950
Unearned compensation	(9,014)	(12,562)
Retained earnings	430,996	437,269
Accumulated other comprehensive income	3,377	11,081
Less: Grantor Stock Trust held at market value, 5,954,747 shares and 7,176,678 shares at December 31, 2005 and 2004, respectively	(82,414)	(96,885)
Less: Common Stock held in treasury, at cost, 8,500,811 shares and 8,497,667 shares at December 31, 2005 and 2004, respectively	(141,423)	(141,384)
Total shareholders' equity	<u>596,048</u>	<u>586,317</u>
	<u>\$ 764,498</u>	<u>\$ 735,737</u>

CALLAWAY GOLF COMPANY
CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share data)

	YEAR ENDED DECEMBER 31,					
	2005		2004		2003	
Net sales	\$ 998,093	100%	\$ 934,564	100%	\$ 814,032	100%
Cost of sales	583,679	58%	575,742	62%	445,417	55%
Gross profit	414,414	42%	358,822	38%	368,615	45%
Selling expenses	290,074	29%	263,089	28%	207,783	26%
General and administrative expenses	80,145	8%	89,878	10%	65,448	8%
Research and development expenses	26,989	3%	30,557	3%	29,529	4%
Total operating expenses	397,208	40%	383,524	41%	302,760	37%
Income (loss) from operations	17,206	2%	(24,702)	(3)%	65,855	8%
Interest and other income (expense), net	(390)		1,934		3,550	
Interest expense	(2,279)		(945)		(1,522)	
Income (loss) before income taxes	14,537	1%	(23,713)	(3)%	67,883	8%
Provision for (benefit from) income taxes	1,253		(13,610)		22,360	
Net income (loss)	<u>\$ 13,284</u>	1%	<u>\$ (10,103)</u>	(1)%	<u>\$ 45,523</u>	6%
Earnings (loss) per common share:						
Basic	\$ 0.19		\$ (0.15)		\$ 0.69	
Diluted	\$ 0.19		\$ (0.15)		\$ 0.68	
Common equivalent shares:						
Basic	68,646		67,721		66,027	
Diluted	69,239		67,721		66,471	

CALLAWAY GOLF COMPANY
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	YEAR ENDED DECEMBER 31,		
	2005	2004	2003
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income (loss)	\$ 13,284	\$ (10,103)	\$ 45,523
Adjustments to reconcile net income (loss) to net cash provided by operating activities:			
Depreciation and amortization	38,260	51,154	44,496
Loss on disposal of long-lived assets	4,031	7,669	24,163
Tax benefit (reversal of benefit) from exercise of stock options	2,408	2,161	(982)
Noncash compensation	6,527	1,741	15
Net noncash foreign currency hedging loss	—	1,811	2,619
Net loss from sale of marketable securities	—	—	98
Deferred taxes	(3,906)	7,707	(8,320)
Changes in assets and liabilities, net of effects from acquisitions:			
Accounts receivable	2,296	(1,048)	12,698
Inventories	(65,595)	10,299	4,897
Other assets	7,583	1,554	(4,743)
Accounts payable	32,740	(16,945)	(2,561)
Accrued employee compensation and benefits	5,121	(5,895)	(3,898)
Warranty liability	1,224	(584)	(838)
Income taxes receivable and payable	26,676	(40,711)	4,004
Deferred compensation	(351)	(273)	1,572
Net cash provided by operating activities	<u>70,298</u>	<u>8,537</u>	<u>118,743</u>
CASH FLOWS FROM INVESTING ACTIVITIES:			
Capital expenditures on PP&E	(34,259)	(25,986)	(7,810)
Proceeds from sale of long-lived assets	1,363	431	178
Acquisitions, net of cash acquired	—	(9,204)	(160,321)
Proceeds from sale of marketable securities	—	—	24
Net cash used in investing activities	<u>(32,896)</u>	<u>(34,759)</u>	<u>(167,929)</u>
CASH FLOWS FROM FINANCING ACTIVITIES:			
Issuance of Common Stock	14,812	20,311	17,994
Acquisition of Treasury Stock	(39)	(6,298)	(4,755)
Proceeds from (payments on) Line of Credit, net	(13,000)	13,000	—
Dividends paid	(19,557)	(19,069)	(18,536)
Other financing activities	(44)	—	(8,117)
Net cash (used in) provided by financing activities	<u>(17,828)</u>	<u>7,944</u>	<u>(13,414)</u>
Effect of exchange rate changes on cash and cash equivalents	<u>(1,750)</u>	<u>2,595</u>	<u>1,488</u>
Net increase (decrease) in cash and cash equivalents	<u>17,824</u>	<u>(15,683)</u>	<u>(61,112)</u>
Cash and cash equivalents at beginning of year	<u>31,657</u>	<u>47,340</u>	<u>108,452</u>
Cash and cash equivalents at end of year	<u>\$ 49,481</u>	<u>\$ 31,657</u>	<u>\$ 47,340</u>
Supplemental disclosures (See Note 3 for acquisition-related disclosures):			
Cash paid for interest and fees	\$ (2,096)	\$ (1,384)	\$ (835)
Cash paid for income taxes	\$ (24,837)	\$ (17,379)	\$ (30,925)

Accounting ACCT611

SAMPLE WAIVER EXAM – PART 1

NOTE: The questions in SAMPLE WAIVER EXAM – Part 1 combined with the questions in SAMPLE WAIVER EXAM – Part 2 together comprise a good example of the knowledge needed to waive ACCT611. SAMPLE WAIVER EXAM – Part 1 covers the topics of accounts receivable, inventory, long-lived assets, and long-term debt. SAMPLE WAIVER EXAM – Part 2 covers the topics of leases, taxes, shareholders' equity, and inter-corporate investments.

NAME

(Print) Last First Nickname

PENN ID NUMBER

(8 middle digits)

■ Instructions

1. Please PRINT your name and Penn ID number on THIS PAGE AND THE NEXT PAGE. USE THE FIRST NAME UNDER WHICH YOU ARE REGISTERED. SEPARATELY LIST YOUR NICKNAME IF YOU USE ONE. Please circle your instructor's name and your class time.

Please PRINT your name and Penn ID number on the first page of the financial statement packet.

2. This is an 82 point exam. Budget your time to achieve maximum points.
3. This exam consists of a question packet and a separate financial statement packet. The question packet consists of 17 pages. The financial statement packet consists of 10 pages. Make sure you have all of the pages in each packet.
4. Answer the problems **only in the space indicated. Answers placed elsewhere will not be graded.** Present your work in an orderly fashion to facilitate the awarding of partial credit. Partial credit can only be given for answers that are presented in a manner which is clear, logical, and easily read.
5. The exam is closed book. You are only allowed one 8.5 x 11 inch paper for notes.
6. Hand in both the question packet and the financial statement packet when you are done.

Question	Points Assigned	Points Scored
Question 1	18	
Question 2	20	
Question 3	23	
Question 4	21	
Total	82	

Questions 1 – 3 are based on the financial statement of Carter's Inc. **for the period ending Jan. 1, 2005 (referred to as fiscal 2004)**. Carter's Inc. is the largest branded marketer of apparel for babies and young children in the department store, national chain, outlet, specialty store, and off-price sales channels, with 8.2% of the market in 2004, up from 7.1% in 2003.

QUESTION I: ACCOUNTS RECEIVABLES AND INVENTORIES

(18 pts assigned) (_____ pts scored)

Assume that Carter's treats Bad Debt Expense as a contra-revenue account, i.e., it is deducted from Sales Revenue to determine Net Sales.

1. (3 pts) What was the amount of Bad Debt Expense which Carter's recognized in fiscal 2004?

2. (3 pts) By how much would Carter's Inc. net income before taxes have been increased or decreased if they had used the Direct Write-Off method rather than the Allowance method to account for its bad debt? Indicate the amount and whether it would have been an increase or decrease.

\$ _____

(circle one) INCREASED DECREASED

3. (4 pts) What was the net effect of business acquisitions, business divestitures and foreign currency translation adjustments on Accounts Receivables for fiscal 2004? Indicate the amount and whether the net effect resulted in an increase, decrease or no change in Accounts Receivables. **To receive credit you must show the work behind your answer.**

\$ _____

(circle one) INCREASE DECREASE NO CHANGE

4. (5 pts) How much in cash did Carter's Inc. collect from its customers in fiscal 2004?

5. (3 pts) By how much did Carter's Inc. reduce fiscal 2004's net income before tax as a result of applying Lower of Cost or Market to its inventory?

QUESTION II: LONG-LIVED ASSETS (20 pts assigned) (_____ pts scored)

Assume:

1. The depreciation and amortization add-back on the Statement of Cash Flows includes depreciation on Property, Plant and Equipment **as well as amortization on other assets.**
 2. The Loss (gain) on disposal of assets on the Statement of Cash Flows includes the loss (gain) on the sale of property, plant and equipment **as well as the loss (gain) on the sale of other assets.**
 3. **All depreciation on property, plant and equipment is expensed.**
 4. All property, plant and equipment acquired during fiscal 2004 was acquired for cash and all property, plant and equipment sold during fiscal 2004 was sold for cash.
 5. Long-lived assets were not affected in fiscal 2004 by any business acquisitions, business divestitures or foreign currency translation adjustments.
-
1. (3 pts) How much depreciation expense on property, plant and equipment did Carter's Inc. recognize in fiscal 2004?

 2. (3 pts) What was the amount of property, plant and equipment which Carter's Inc. purchased during fiscal 2004?

 3. (4 pts) What was the net book value of the property, plant and equipment which Carter's Inc. sold (disposed of) during fiscal 2004.

4. (4 pts) What was the gain or loss which Carter's Inc. recognized on its sale of property, plant and equipment in fiscal 2004?

\$ _____

(circle one) GAIN LOSS NO GAIN OR LOSS

5. (3 pts) Refer to the long-lived asset, Trade name. Does Carter's Inc. treat this asset as one that has a definite life (and is therefore amortizable) or as one that has an indefinite life (and therefore not amortizable)? **You must present your reasoning in order to receive any points.**

6. (3 pts) In the fiscal year ending December 28, 2002, Carter's Inc. recorded a Write-down of long-lived assets. If that write-down had not been taken, how much greater or less would Carter's Inc. fiscal 2002 Cash from Operating Activities have been?

\$ _____

(circle one) GREATER LESS NO EFFECT

QUESTION III: LONG-TERM DEBT (23 pts assigned) (_____ pts scored)

Assume:

1. The beginning and ending balances in Current maturities of long-term debt consist entirely of debt that was **issued at par**.
2. All the debt in the fiscal 2004 beginning balance of Current maturities of long-term debt was retired in fiscal 2004.
3. All long-term debt issued in fiscal 2004 was issued for cash.
4. All long-term debt retired during fiscal 2004 was retired with cash.

1. (3 pts) What was the amount of long-term debt discount amortized by Carter's Inc. during fiscal 2004?

2. (2 pts) What was the amount of long-term debt issued by Carter's Inc. in fiscal 2004?

3a. (3 pts) What was the net book value of long-term debt retired **at maturity** by Carter's Inc. in fiscal 2004?

3b. (3 pts) What was the gain or loss on the long-term debt which Carter's Inc. retired **at maturity** in fiscal 2004?

\$ _____

(circle one)

GAIN

LOSS

NO GAIN OR LOSS

4a. (5 pts) What was the cash paid by Carter's Inc. in fiscal 2004 to retire long-term debt **prior to maturity**?

4b. (4 pts) What was the **net book value** of long-term debt retired **prior to maturity** by Carter's Inc. in fiscal 2004?

5. (3 pts) Consider Carter's Inc. senior subordinated debt. As of the end of fiscal 2004 is the yield to maturity (i.e., the market rate of interest) higher, lower, or the same as it was on the date the senior subordinated debt was issued (i.e., the historical yield to maturity)?

\$ _____

(circle one) HIGHER LOWER THE SAME

QUESTION IV: INVENTORY (21 pts assigned) (_____ pts scored)

Question IV refers to the 2005 financial statements of AK Steel. Assume a 35% tax rate.

1. (4 pts) How much greater or less would AK Steel's **2005** cost of goods sold have been if it had always used FIFO for all of its inventory?

\$ _____

(circle one) GREATER LESS

2. (5 pts) What was the dollar effect of input price inflation or deflation on AK Steel's LIFO Reserve during 2005?

3. (4 pts) The following statement is made in AK Steel's Management Discussion and Analysis:

"As a result of the progressively increasing cost of raw materials, the Company recorded LIFO charges in both 2005 and 2004, although those charges decreased to \$60.1 from \$200.7, year over year."

What was AK Steel's LIFO Reserve as of the end of 2003?

4. (8 pts) Assume that AK Steel had always used FIFO rather than LIFO for **both** financial reporting and tax reporting purposes. This would have affected its Statement of Cash Flows in each year. Below are several line items from AK Steel's **2005** Operating Activities section of its Statement of Cash Flows. Indicate the effect on the line items in the Cash flows from operating activities that would be different (both the amount of the difference and the sign) if AK Steel had always used FIFO rather than LIFO for financial and tax reporting purposes. **Note that we are just asking for the one-period effect on AK Steel's 2005 Operating Activities section of its Statement of Cash Flows of AK Steel using FIFO vs. LIFO.** Assume that any additional taxes (to be paid or refunded) in 2005 arising from the use of FIFO rather than LIFO have not yet been paid or received. Assume a 35% tax rate.

Name of "Cash flows from operating activities" line item	Amount and direction of effect (use +/- to indicate increase/decrease)
Net Income	
Adjustments to reconcile net income (loss) to cash flows	
Changes in Inventory	
Changes in Other Assets	
Changes in Other liabilities	
Net cash flows from operating activities of continuing operations	

**CARTER'S, INC.
AND THE WILLIAM CARTER COMPANY**
CONSOLIDATED BALANCE SHEETS
(dollars in thousands, except for share data)

	January 1, 2005	January 3, 2004
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 33,265	\$ 36,061
Accounts receivable, net of reserve for doubtful accounts of \$2,878 in fiscal 2004 and \$2,363 in fiscal 2003	80,440	65,318
Inventories, net	120,792	104,760
Prepaid expenses and other current assets	4,499	6,625
Deferred income taxes	12,571	9,045
Total current assets	251,567	221,809
Property, plant, and equipment, net	53,187	50,502
Tradename	220,233	220,233
Cost in excess of fair value of net assets acquired	139,282	139,282
Other assets	2,829	3,485
Total assets	<u>\$ 672,965</u>	<u>\$ 646,102</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Current maturities of long-term debt	\$ 724	\$ 3,336
Accounts payable	26,453	30,436
Other current liabilities	40,696	37,405
Total current liabilities	67,873	71,177
Long-term debt	183,778	209,377
Deferred income taxes	83,579	83,196
Other long-term liabilities	9,802	9,816
Total liabilities	<u>345,032</u>	<u>373,566</u>
Commitments and contingencies		
Stockholders' equity:		
Carter's, Inc., preferred stock; par value \$.01 per share; 100,000 shares authorized; none issued or outstanding at January 1, 2005 and January 3, 2004	—	—
Carter's, Inc., common stock, voting; par value \$.01 per share; 40,000,000 shares authorized; 28,432,452 shares issued and outstanding at January 1, 2005; 27,985,360 shares issued and outstanding at January 3, 2004 (TWCC's common stock, voting; par value \$.01 per share; 200,000 shares authorized, 1,000 shares issued and outstanding at January 1, 2005 and January 3, 2004)	284	280
Additional paid-in capital	247,610	241,780
Deferred compensation	(95)	—
Retained earnings	80,134	30,476
Total stockholders' equity	<u>327,933</u>	<u>272,536</u>
Total liabilities and stockholders' equity	<u>\$ 672,965</u>	<u>\$ 646,102</u>

The accompanying notes are an integral part of these financial statements.

**CARTER'S, INC.
AND THE WILLIAM CARTER COMPANY**
CONSOLIDATED STATEMENTS OF OPERATIONS
(dollars in thousands, except per share data)

	FOR THE FISCAL YEARS ENDED		
	January 1, 2005	January 3, 2004	December 28, 2002
Net sales	\$ 823,121	\$ 703,826	\$ 579,547
Cost of goods sold	525,082	448,540	352,151
Gross profit	298,039	255,286	227,396
Selling, general, and administrative expenses	208,756	188,028	174,110
Write-down of long-lived assets	—	—	150
Closure costs	620	1,041	—
Deferred charge write-off	—	—	923
Management fee termination	—	2,602	—
Royalty income	(12,362)	(11,025)	(8,352)
Operating income	101,025	74,640	60,565
Income before income taxes	82,508	38,926	32,264
Provision for income taxes	32,850	15,648	13,011
Net income	\$ 49,658	\$ 23,278	\$ 19,253
CARTER'S, INC.			
Basic net income per common share	\$ 1.77	\$ 0.99	\$ 0.86
Diluted net income per common share	\$ 1.66	\$ 0.92	\$ 0.82
Basic weighted average number of shares outstanding	28,125,584	23,611,372	22,453,088
Diluted weighted average number of shares outstanding	29,927,957	25,187,492	23,544,900

The accompanying notes are an integral part of these financial statements.

**CARTER'S, INC.
AND THE WILLIAM CARTER COMPANY**
CONSOLIDATED STATEMENTS OF CASH FLOWS
(dollars in thousands)

	FOR THE FISCAL YEARS ENDED		
	January 1, 2005	January 3, 2004	December 28, 2002
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income	\$ 49,658	\$ 23,278	\$ 19,253
Loss on extinguishment of debt	xxxxxxxx	xxxxxxxx	xxxxxxx
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	19,536	22,216	18,693
Amortization of long-term debt discount	75	126	130
Non-cash stock compensation expense	xxxxxxxx	xxxxxxxx	xxxxxxxx
Non-cash closure costs	—	184	—
Write-down of long-lived assets	—	—	150
Loss (gain) on disposal of assets	164	61	(9)
Tax benefit from exercise of stock options	xxxxxxxx	xxxxxxxx	xxxxxxxx
Deferred tax (benefit) provision	(3,143)	299	(1,264)
Effect of changes in operating assets and liabilities:			
Increase in accounts receivable	(15,122)	(11,718)	(18,132)
(Increase) decrease in inventories	(16,032)	940	(16,631)
Decrease (increase) in prepaid expenses and other assets	2,132	(2,258)	2,055
(Decrease) increase in accounts payable and other liabilities	(575)	(4,339)	20,660
Net cash provided by operating activities	<u>42,676</u>	<u>40,506</u>	<u>27,304</u>
CASH FLOWS FROM INVESTING ACTIVITIES:			
Purchase of Property, plant and equipment	(20,481)	(17,347)	(18,009)
Proceeds from sale of property, plant, and equipment	1,304	275	955
Collections on loan	600	600	1,500
Net cash used in investing activities	<u>(18,577)</u>	<u>(16,472)</u>	<u>(15,554)</u>
CASH FLOWS FROM FINANCING ACTIVITIES:			
Payments of term loan	(28,286)	(24,138)	(1,250)
Redemption of 10.875% Senior Subordinated Notes	—	(61,250)	—
Payment of debt redemption premium	—	(6,661)	—
Payment of dividend	—	(24,893)	—
Payments of debt issuance costs	—	(799)	—
Proceeds from stock option exercises	1,555	—	—
Proceeds from sale of common stock	—	600	1,000
Net cash used in financing activities	<u>(26,895)</u>	<u>(23,535)</u>	<u>(880)</u>
Net (decrease) increase in cash and cash equivalents	(2,796)	499	10,870
Cash and cash equivalents at beginning of period	36,061	35,562	24,692
Cash and cash equivalents at end of period	<u>\$ 33,265</u>	<u>\$ 36,061</u>	<u>\$ 35,562</u>

The accompanying notes are an integral part of these financial statements.

NOTE 2: Summary of Significant Accounting Policies**Fiscal Year**

Our fiscal year ends on the Saturday in December or January nearest to the last day of December. The accompanying consolidated financial statements reflect our financial position as of January 1, 2005 and January 3, 2004 and results of operations for the fiscal years ended January 1, 2005, January 3, 2004, and December 28, 2002. The fiscal year ended January 3, 2004 (fiscal 2003) contains 53 weeks. The fiscal years ended January 1, 2005 (fiscal 2004) and December 28, 2002 (fiscal 2002), each contain 52 weeks.

Property, Plant, and Equipment

Property, plant, and equipment are stated at cost, less accumulated depreciation. When fixed assets are sold or otherwise disposed, the accounts are relieved of the original costs of the assets, and the related accumulated depreciation and any resulting profit or loss is credited or charged to income. For financial reporting purposes, depreciation and amortization are computed on the straight-line method over the estimated useful lives of the assets as follows: buildings—15 to 26 years and machinery and equipment—3 to 10 years. We capitalize the cost of our fixtures designed and purchased for use at major wholesale and mass channel accounts. The cost of these fixtures is amortized over a three-year period.

Cost in Excess of Fair Value of Net Assets Acquired and Other Intangible Assets

Cost in excess of fair value of net assets acquired (“goodwill”) represents the excess of the cost of the Acquisition over the fair value of the net assets acquired.

In connection with the Acquisition, we adopted the provisions of Statements of Financial Accounting Standards (“SFAS”) No. 141, “Business Combinations” (“SFAS 141”), and applied the required provisions of SFAS No. 142, “Goodwill and other Intangible Assets” (“SFAS 142”). Accordingly, our tradename and goodwill are deemed to have indefinite lives and are not being amortized. Our licensing agreements, however, recognized in the allocation of the Acquisition purchase price, were amortized over the average three-year life of such agreements, as it was determined that these agreements have finite lives. Amortization expense on our licensing agreements was \$3.1 million for fiscal 2004 and \$5.0 million in fiscal 2003 and fiscal 2002. The licensing agreements were fully amortized as of August 15, 2004.

We adopted the remaining provisions of SFAS 142 as of the beginning of fiscal 2002. In accordance with this statement, we identified our reporting units, and have completed the required assessments for impairment of goodwill (by comparing the fair values of our reporting units to their respective carrying values, including allocated goodwill) and our tradename and found that there was no impairment of either asset, either at the initial adoption date or at the most recent assessment performed as of January 1, 2005.

We measure our goodwill and tradename for impairment on at least an annual basis or if events or changes in circumstances so dictate.

NOTE 4: Property, Plant, and Equipment**Property, plant, and equipment consisted of the following:***(dollars in thousands)*

	January 1, 2005	January 3, 2004
Land, buildings, and improvements	\$ 27,333	\$ 26,326
Machinery and equipment	53,863	41,766
Marketing fixtures	11,301	14,686
Construction in progress	2,064	676
	94,561	83,454
Accumulated depreciation and amortization	(41,374)	(32,952)
Total	\$ 53,187	\$ 50,502

Depreciation expense on property, plant and equipment was \$16,411,000 for the fiscal year ended January 1, 2005, \$17,216,000 for the fiscal year ended January 3, 2004, and \$13,693,000 for the fiscal year ended December 28, 2002.

NOTE 5: Long-term Debt**Long-term debt consisted of the following:***(dollars in thousands)*

	January 1, 2005	January 3, 2004
Senior credit facility term loan	\$ 71,326	\$ 99,612
10.875% Series B Senior Subordinated Notes due 2011, net of unamortized discount of \$574 in fiscal 2004 and \$649 in fiscal 2003	113,176	113,101
	184,502	212,713
Current maturities	(724)	(3,336)
Total	\$ 183,778	\$ 209,377

The fair value of our senior subordinated notes was approximately \$13.7 million greater than the book value as of January 1, 2005 and \$17.6 million greater than the book value as of January 3, 2004. The fair values were estimated based on similar issues or on current rates offered to us for debt of the same remaining maturity.

NOTE 12: Valuation and Qualifying Accounts**Information regarding accounts receivable and inventory reserves is as follows:***(dollars in thousands)*

	Accounts receivable reserves	Inventory reserves
Balance, December 29, 2001	\$ 1,673	\$ 1,681
Additions, charged to expense	2,578	1,177
Write-offs	(2,371)	—
Balance, December 28, 2002	1,880	2,858
Additions, charged to expense	2,161	6,682
Write-offs	(1,678)	(4,508)
Balance, January 3, 2004	2,363	5,032
Additions, charged to expense	3,520	11,119
Write-offs	(3,005)	(6,267)
Balance, January 1, 2005	\$ 2,878	\$ 9,884

AK STEEL HOLDING CORPORATION

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(dollars in thousands, except per share data)

Inventories

Inventories are valued at the lower of cost or market. The cost of the majority of inventories is measured on the last in, first out (“LIFO”) method. Other inventories are measured principally at FIFO and consist mostly of foreign inventories and certain raw materials.

	2005	2004
Finished and semifinished	\$ 776.3	738.7
Raw materials and supplies	344.4	229.4
Adjustment to state inventories at LIFO value	(351.7)	(291.6)
Total	769.0	676.5

During 2005, 2004 and 2003, liquidation of LIFO layers increased net income before taxes of \$9.0, 25.1 and \$11.1, respectively.

Accounting ACCT611**SAMPLE WAIVER EXAM – PART 2****NAME***(Print)**Last**First**Nickname***PENN ID NUMBER***(8 middle digits)***■ Instructions**

1. Please PRINT your Penn ID number **on this page and every page of the exam**. Please circle your instructor's name and your class time.
2. This is a 99 point exam. Budget your time to achieve maximum points.
3. This exam consists of a question packet and a separate financial statement packet. The question packet consists of 19 pages. The financial statement packet consists of 13 pages. Make sure you have all of the pages in each packet.
4. Answer the problems **only in the space indicated**. **Answers placed elsewhere will not be graded**. Present your work in an orderly fashion to facilitate the awarding of partial credit. Partial credit can only be given for answers that are presented in a manner which is clear, logical, and easily read.
5. The exam is closed book. You are only allowed one 8.5 x 11 inch paper for notes.
6. Hand in only the question packet when you are done.

Question	Points Assigned	Points Scored
Question 1	35	
Question 2	20	
Question 3	15	
Question 4	29	
Total	99	

Questions 1, 2 and 3 are based on the financial statement of Health Net Inc.

Health Net, Inc. is an integrated managed care organization that delivers managed health care services. We are among the nation's largest publicly traded managed health care companies. Our health plans and government contracts subsidiaries provide health benefits through our health maintenance organizations (HMOs), insured preferred provider organizations (PPOs) and point of service (POS) plans to approximately 6.3 million individuals in 27 states and the District of Columbia through group, individual, Medicare, Medicaid and TRICARE programs.

QUESTION 1: TAXES (35 pts assigned) (_____ pts scored)

1. (3 pts) What was the journal entry to record income tax expense in 2005? You may record a “net” Deferred Tax Asset or Liability – you do not need to distinguish between the two.

Account	Debit	Credit

2. (4 pts) What was the company's income **before** tax in 2005? Note that the Income Statement has not been provided.

3. (3 pts) The company has a valuation allowance for deferred tax assets. What would be the impact on 2006 income **after taxes** if the company reduced the valuation allowance to \$16.5 million in 2006?

\$ _____

(circle one) INCREASE DECREASE NO CHANGE

4. (3 pts) Assume the balance in income taxes payable at January 1, 2005 was \$20.3 million. What was the balance in income taxes payable at December 31, 2005?

All the parts of Question 5 pertain to the tax exempt interest income the company earned in 2005.

- 5a.** (2 pts) Indicate whether the tax exempt interest income resulted in an INCREASE, DECREASE or NO CHANGE to the statutory tax rate during 2005:

(circle one) INCREASE DECREASE NO CHANGE

- 5b.** (2 pts) Indicate whether the tax exempt interest income resulted in an INCREASE, DECREASE or NO CHANGE to the effective tax rate during 2005:

(circle one) INCREASE DECREASE NO CHANGE

- 5c.** (2 pts) Indicate whether the tax exempt interest income resulted in an INCREASE, DECREASE or NO CHANGE to the deferred tax expense during 2005:

(circle one) INCREASE DECREASE NO CHANGE

- 5d.** (2 pts) Indicate whether the tax exempt interest income resulted in an INCREASE, DECREASE or NO CHANGE to Net Deferred Tax Assets at December 31, 2005:

(circle one) INCREASE DECREASE NO CHANGE

All the parts of Question 6 pertain only to the **Unearned (or Deferred) Revenue** the company recorded in 2005.

- 6a.** (3 pts) The company recorded greater revenue for tax purposes than for financial reporting purposes in 2005. Indicate TRUE or FALSE.

(circle one) TRUE FALSE

- 6b.** (3 pts) The company has cumulatively recorded greater revenue for tax purposes than for financial reporting purposes as of Dec. 31, 2005. Indicate TRUE or FALSE.

(circle one) TRUE FALSE

6c. (4 pts) For this question only, assume that deferred taxes are recorded at 29%.

How much was the difference between the revenues recognized in 2005 for financial reporting purposes and for tax reporting purposes?

- a.** 27.7 **d.** 6.9
b. 58.3 **e.** 3.3
c. 2 **f.** 16.9

7. (4 pts) Note that Health Net has net Deferred Tax Assets (Deferred Tax Assets are greater than Deferred Tax Liabilities). Suppose Congress announced a tax rate increase commencing in 2006. What effect would this increase in expected future tax rates have on the following for the end of 2005. Indicate whether it would result in an: INCREASE, DECREASE, or NO EFFECT

Net Deferred Tax Asset _____

Income Taxes Payable _____

Income Tax Expense _____

QUESTION II: INTERCORPORATE INVESTMENTS (20 pts assigned) (____ pts scored)

Assume:

1. All of Health Net's intercorporate investments are classified as Available for Sale
 2. There were no business acquisitions, business divestitures, foreign currency translation adjustments or impairments which affected Health Net's intercorporate investments during 2005
 3. All purchases of intercorporate investments were for cash and all sales were for cash.
1. (4 pts) What was the journal entry to record Health Net's overall adjustment to its cumulative unrealized holding gains and losses in 2005 arising either from increases or decreases in the market prices of investments or from the sales of investments for 2005? There is no need to distinguish between a Deferred Tax Asset and Deferred Tax Liability.

Account	Debit	Credit

2. (4 pts) What was the historical cost of the Available for Sale securities which Health Net sold or matured in 2005?

3. (3 pts) What was the realized holding or loss that Health Net recognized in 2005 on the sale of Available for Sale securities? Indicate the amount and whether it was a realized holding gain or loss.

\$ _____

(circle one) REALIZED HOLDING GAIN REALIZED HOLDING LOSS

4. (3 pts) How much greater or smaller would Health Net's 2005 income before tax have been if it had always accounted for its Available for Sale securities as Trading Securities? Indicate the amount and whether income before tax would have been greater or smaller.

\$ _____

(circle one) GREATER SMALLER NO DIFFERENT

5. (3 pts) **For this question, ignore information from all other parts of this exam.**

What tax rate is Health Net using in 2005 to account for the Deferred Taxes arising from the unrealized holding gain and loss of its Available for Sale securities?

6. (3 pts) Assume that Health Net had sold all of its Available for Sale securities on Dec. 31, 2005. How much greater or less would its net income after tax have been? Assume a 40% tax rate. Indicate the amount and whether net income after tax would have been greater or smaller.

(circle one) GREATER SMALLER NO DIFFERENT

QUESTION III: SHAREHOLDERS' EQUITY (15 pts assigned) (____ pts scored)

Please refer to the 2005 financial statements and footnote disclosures of Health Net Inc.

1. (3 pts) How many common shares does Health Net have outstanding at Fiscal year-end 2005?

2. Refer to the Treasury Stock that Health Net held at Fiscal year-end 2005. Assume that all of these shares had been repurchased at the same stock price.
 - a. (3 pts) What is the average price per share that Health Net paid for its treasury shares held as of Fiscal year-end 2005?

 - b. (3 pts) Provide the journal entry that Health Net would have recorded if it had decided to reissue all of the treasury shares held at Fiscal year-end 2005 for \$750 million.

Account	Debit	Credit

3. Consider the following information disclosed by Health Net:

Earnings Per Share

Diluted earnings per share is based upon the weighted average shares of common stock and dilutive common stock equivalents (this reflects the potential dilution that could occur if stock options were exercised and restricted stocks were vested) outstanding during the periods presented.

For the year ended December 31, 2004, common stock equivalents arising from dilutive stock options and restricted common stock amounted to 6,179 shares (thousands).

Health Net's 2004 Basic EPS = \$ 0.38

Weighted average number of shares used in Health Net's 2004 Diluted EPS = 118,038 shares (thousands)

- a. (3 pts) What is Health Net's 2004 Net Income?

- b. (3 pts) For this question only, assume Health Net's 2004 net income is \$50 million. Also, assume Health Net had paid \$10 million in preferred dividends in 2004 (in reality, they paid no preferred dividends in 2004). Compute diluted earnings per share in 2004 under this assumption.

QUESTION IV: LEASES (29 pts assigned) (_____ pts scored)

Please refer to the 2005 financial statements and footnote disclosures of Safeway Inc.

Safeway Inc. is one of the largest food and drug retailers in North America, with 1,775 stores at year-end 2005. The Company's U.S. retail operations are located principally on the West Coast. The Company's Canadian retail operations are located principally in British Columbia.

Assume that there were no business acquisitions, business divestitures, foreign currency translation adjustments or impairments associated with Safeway's leases during 2005. Further assume that all required payments on all leases are made on the last day of the fiscal year.

1. (2 pts) Safeway is considering a new noncancelable lease. The asset to be leased is worth \$65,000 and has a useful life of 7 years. The lease would require the firm to pay \$11,000 per year for 5 years. There would be no bargain purchase option or transfer of ownership at the end of the lease. Would Safeway categorize this lease as capital or operating?

(circle one) CAPITAL OPERATING

2. (3 pts) Record the journal entry that Safeway expects to make in 2006 related to obligations under capital leases. Assume that no leases are prematurely canceled in 2006 and no new leases are entered into in 2006. You are not required to record the journal entry for the capital leased assets (i.e., you are only required to record the entry for the capital lease liabilities).

Account	Debit	Credit

3. (3 pts) Estimate the average interest rate that Safeway is using to determine the net book value of its

capital lease liabilities as of fiscal year-end 2005?

4. (2 pts) Relative to having no leases, what will be the total effect of Safeway's operating and capital leases on Cash Flow from Operations in 2006? Assume no leases are prematurely canceled in 2006 and no new leases are entered into in 2006.

(circle one) NO EFFECT GREATER SMALLER

by \$ _____

5. (2 pts) Relative to having no leases, what will be the total effect of Safeway's operating and capital leases on Cash Flow from Investing Activities in 2006? Assume no leases are prematurely canceled in 2006 and no new leases are entered into in 2006.

(circle one) NO EFFECT GREATER SMALLER

by \$ _____

6. (2 pts) Relative to having no leases, what will be the total effect of Safeway's operating and capital leases on Cash Flow from Financing Activities in 2006? Assume no leases are prematurely canceled in 2006 and no new leases are entered into in 2006.

(circle one) NO EFFECT GREATER SMALLER

by \$ _____

7. (5 pts) Safeway did cancel capital leases early in 2005. What was the net book value of the assets under capital leases that were cancelled in 2005?

8. (7 pts) Assume Safeway were to capitalize its operating leases on January 1, 2006. Further assume that the present value of the operating lease cash flows — using a discount rate of 10% — is \$3,589 (millions) and that any resulting assets are amortized straight-line with no salvage value over 10 years.

- a. Give the all journal entries for the fiscal year 2006 related to these leases.

Account	Debit	Credit

- b. (3 pts) How would Safeway's 2006 Cash Flow from Operations be different as a result of capitalizing its operating leases. You need to provide only the direction of the difference — not the dollar value. Assume no leases are prematurely canceled in 2006 and no new leases are entered into in 2006.

(circle one)

NO CHANGE

GREATER

SMALLER

HEALTH NET, INC.
CONSOLIDATED BALANCE SHEETS
(Amounts in thousands)

	DECEMBER 31,	
	2005	2004
ASSETS		
Current Assets:		
Cash and cash equivalents	\$ 742,485	\$ 722,102
Investments-available for sale	1,363,800	1,060,000
Premiums receivable, net of allowance for doubtful accounts (2005–\$7,204, 2004–\$9,016)	132,019	118,521
Amounts receivable under government contracts	122,796	129,483
Other assets	111,512	97,163
Total current assets	2,911,618	2,492,314
Property and equipment, net	125,773	184,643
Goodwill, net	723,595	723,595
Other noncurrent assets	130,267	207,050
Total Assets	<u>\$ 3,940,722</u>	<u>\$ 3,653,194</u>
LIABILITIES AND STOCKHOLDERS EQUITY		
Current Liabilities:		
Reserves for claims and other settlements	\$ 1,040,171	\$ 1,169,297
Health care and other costs payable under government contracts	62,536	119,219
IBNR health care costs payable under TRICARE North contract	265,517	173,951
Unearned premiums	106,586	139,766
Accounts payable and other liabilities	364,266	258,923
Total current liabilities	1,839,076	1,861,156
Senior notes payable	387,954	397,760
Other noncurrent liabilities	124,617	121,398
Total Liabilities	<u>2,351,647</u>	<u>2,380,314</u>
Commitments and contingencies		
Stockholders Equity:		
Preferred stock (\$0.001 par value, 10,000 shares authorized, none issued and outstanding)	—	—
Common stock (\$0.001 par value, 350,000 shares authorized; issued 2005-137,898 shares; 2004-134,450 shares)	137	134
Restricted common stock	6,883	7,188
Unearned compensation	(2,137)	(4,110)
Additional paid-in capital	906,789	811,292
Treasury common stock, at cost (2005-23,182 shares; 2004-23,173 shares)	(633,375)	(632,926)
Retained earnings	1,324,165	1,094,380
Accumulated other comprehensive loss	(13,387)	(3,078)
Total Stockholders Equity	<u>1,589,075</u>	<u>1,272,880</u>
Total Liabilities and Stockholders Equity	<u>\$ 3,940,722</u>	<u>\$ 3,653,194</u>

See accompanying notes to consolidated financial statements.

HEALTH NET, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(Amounts in thousands)

	Common Stock Shares	Common Stock Amount	Restricted Common Stock	Unearned Compensation	Additional Paid-In Capital	Common Stock Held in Treasury Shares	Common Stock Amount	Retained Earnings	Accumulated Other Comprehensive (Loss) Income	Total
Balance as of December 31, 2004	134,450	134	7,188	(4,110)	811,292	(23,173)	(632,926)	1,094,380	(3,078)	1,272,880
Comprehensive income:										
Net income										
Minimum pension liability adjustment										
Change in unrealized holding gain or loss on investments, net of tax benefit										
Total comprehensive income										
Exercise of stock options including related tax benefit	3,411	3							(10,341)	(10,341)
Repurchases of common stock										
Issuance of restricted stock	30		869	(869)						219,476
Forfeiture of restricted stock	(13)		(345)	345						94,109
Amortization of restricted stock grants				2,497			(449)			(449)
Lapse of restrictions of restricted stock grants			(829)							—
Employee stock purchase plan	20				829					2,497
Balance as of December 31, 2005	137,898	\$137	\$6,883	\$(2,137)	\$906,789	(23,182)	\$(633,375)	\$1,324,165	\$(13,387)	\$1,589,075

See accompanying notes to consolidated financial statements.

HEALTH NET, INC.**CONSOLIDATED STATEMENTS OF CASH FLOWS***(amounts in thousands)*

	YEAR ENDED DECEMBER 31,		
	2005	2004	2003
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income	\$ xxxxx	\$ xxxxx	\$ xxxxx
Adjustments to reconcile net income to net cash provided by (used in) operating activities:			
Other changes	12,550	3,969	5,138
Changes in assets and liabilities, net of effects of dispositions:			
Premiums receivable and unearned premiums	(46,678)	(18,402)	20,163
Other current assets, receivables and noncurrent assets	2,356	(86,499)	35,915
Amounts receivable/payable under government contracts	(49,996)	(175,345)	23,596
Reserves for claims and other settlements	(129,126)	143,012	2,737
Accounts payable and other liabilities	117,556	(15,749)	(13,686)
Net cash provided by (used in) operating activities	<u>191,394</u>	<u>(54,912)</u>	<u>379,772</u>
CASH FLOWS FROM INVESTING ACTIVITIES:			
Proceeds from Sales and Maturities of investments	513,640	556,774	867,221
Purchases of investments	(833,593)	(498,355)	(977,266)
Sales of property and equipment	79,845	9,670	37
Purchases of property and equipment	(48,846)	(47,616)	(54,952)
Cash received from the sale of businesses and properties	1,949	11,112	90,316
Other			
Net cash used in investing activities	<u>(244,046)</u>	<u>(14,242)</u>	<u>(105,522)</u>
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from exercise of stock options and employee stock purchases	73,484	19,091	42,330
Proceeds from issuance of notes payable and other financing arrangements	—	—	5,680
Repurchases of common stock	(449)	(88,706)	(288,318)
Repayment of debt and other noncurrent liabilities	—	—	(5,864)
Net cash provided by (used in) financing activities	<u>73,035</u>	<u>(69,615)</u>	<u>(246,172)</u>
Net increase (decrease) in cash and cash equivalents	20,383	(138,769)	28,078
Cash and cash equivalents, beginning of year	722,102	860,871	832,793
Cash and cash equivalents, end of year	<u>742,485</u>	<u>\$ 722,102</u>	<u>\$ 860,871</u>
SUPPLEMENTAL CASH FLOWS DISCLOSURE:			
Interest paid	\$ 41,120	\$ 30,722	\$ 36,296
Income taxes paid	96,324	110,316	126,709

See accompanying notes to consolidated financial statements.

HEALTH NET, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 2: Significant Accounting Policies

Cash and Cash Equivalents

Cash equivalents include all highly liquid investments with a maturity of three months or less when purchased.

Investments

Investments classified as available-for-sale are reported at fair value based on quoted market prices, with unrealized gains and losses excluded from earnings and reported as other comprehensive income, net of income tax effects. The cost of investments sold is determined in accordance with the specific identification method and realized gains and losses are included in net investment income.

NOTE 4: Investments

As of December 31, 2005 and 2004, the cost, gross unrealized holding gains and losses, and fair value of our available-for-sale investments were as follows:

2005				
	COST	GROSS UNREALIZED HOLDING GAINS	GROSS UNREALIZED HOLDING LOSSES	CARRYING VALUE
(Dollars in millions)				
Mortgage-backed securities	\$ 368.1	\$ 0.4	\$ (7.2)	\$ 361.3
U.S. government and agencies	371.6	—	(8.7)	362.9
Obligations of states and other political subdivisions	462.8	1.3	(2.4)	461.7
Corporate debt securities	182.6	—	(4.9)	177.7
Other securities	0.2	—	—	0.2
	<u>\$ 1,385.3</u>	<u>\$ 1.7</u>	<u>\$ (23.2)</u>	<u>\$ 1,363.8</u>
2004				
	COST	GROSS UNREALIZED HOLDING GAINS	GROSS UNREALIZED HOLDING LOSSES	CARRYING VALUE
(Dollars in millions)				
Mortgage-backed securities	\$ 379.1	\$ 0.8	\$ (2.9)	\$ 377.0
U.S. government and agencies	446.0	0.7	(2.9)	443.8
Obligations of states and other political subdivisions	34.8	0.3	(0.1)	35.0
Corporate debt securities	204.6	1.0	(1.4)	204.2
	<u>\$ 1,064.5</u>	<u>\$ 2.8</u>	<u>\$ (7.3)</u>	<u>\$ 1,060.0</u>

As of December 31, 2005, the contractual maturities of our available-for-sale investments were as follows:

	COST	ESTIMATED FAIR VALUE
	(Dollars in millions)	
Due in one year or less	\$ 94.7	\$ 93.9
Due after one year through five years	546.3	533.7
Due after five years through ten years	224.1	222.2
Due after ten years	152.1	152.7
Mortgage-backed securities	368.1	361.3
Total available for sale	\$ 1,385.3	\$ 1,363.8

NOTE 10: Income Taxes

Significant components of the provision for income taxes are as follows for the years ended December 31:

	2005
	(Dollars in millions)
CURRENT:	
Federal	\$ 111.4
State	31.0
Total current	142.4
DEFERRED:	
Federal	3.6
State	0.5
Total deferred	4.1
Total income tax provision	\$ 146.5

A reconciliation of the statutory federal income tax rate and the effective income tax rate on income is as follows for the years ended December 31:

	2005	2004	2003
Statutory federal income tax rate	35.0%	35.0%	35.0%
State and local taxes, net of federal income tax effect	5.4	4.1	3.6
Tax exempt interest income	(0.5)	(0.3)	(0.1)
Goodwill and intangible assets amortization	0.1	0.5	0.1
Examination settlements	—	(2.7)	(1.9)
Other, net	(1.1)	0.2	0.8
Effective income tax rate	38.9%	36.8%	37.5%

Significant components of our deferred tax assets and liabilities as of December 31 are as follows:

	2005	2004
	(Dollars in millions)	
DEFERRED TAX ASSETS:		
Accrued liabilities	\$ 100.9	\$ 101.0
Unearned (or Deferred) Revenues	16.9	18.9
Tax credit carryforwards	0.5	0.8
Accrued compensation and benefits	38.1	32.6
Net operating loss carryforwards	57.8	54.6
Other	9.1	2.9
Deferred tax assets before valuation allowance	223.3	210.8
Valuation allowance	(19.7)	(19.8)
Net deferred tax assets	<u>\$ 203.6</u>	<u>\$ 191.0</u>
DEFERRED TAX LIABILITIES:		
Depreciable and amortizable property	\$ 45.5	\$ 44.1
Deferred revenue	19.0	15.1
Other	14.2	9.4
Deferred tax liabilities	<u>\$ 78.7</u>	<u>\$ 68.6</u>

The net deferred tax assets and liabilities are reported as current and noncurrent deferred tax assets in our consolidated balance sheets for the years ended December 31, 2005 and 2004 based on when the amounts are expected to be realized.

As of December 31, 2005, we had federal and state net operating loss carryforwards of approximately \$119.4 million and \$282.0 million, respectively. The net operating loss carryforwards expire between 2007 and 2026. Limitations on utilization may apply to approximately \$36.4 million and \$126.0 million of the federal and state net operating loss carryforwards, respectively. Accordingly, valuation allowances have been provided to account for the potential limitations on utilization of these tax benefits.

SAFEWAY INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(In millions, except per-share amounts)

	YEAR-END 2005	YEAR-END 2004
ASSETS		
Current assets:		
Cash and equivalents	\$ 373.3	\$ 266.8
Receivables	350.6	339.0
Merchandise inventories, net of LIFO reserve of \$48.4 and \$48.6	2,766.0	2,740.7
Prepaid expenses and other current assets	212.5	251.2
Total current assets	<u>3,702.4</u>	<u>3,597.7</u>
Property:		
Land	1,413.9	1,396.0
Buildings	4,419.1	4,269.7
Leasehold improvements	2,958.0	2,621.9
Fixtures and equipment	6,558.7	5,981.3
Property under capital leases	779.1	773.8
	<u>16,128.8</u>	<u>15,042.7</u>
Less accumulated depreciation and amortization	<u>(7,031.7)</u>	<u>(6,353.3)</u>
Total property, net	9,097.1	8,689.4
Goodwill	2,402.4	2,406.6
Prepaid pension costs	179.4	321.0
Investments in unconsolidated affiliates	201.8	187.6
Other assets	173.8	175.1
Total assets	<u>\$ 15,756.9</u>	<u>\$ 15,377.4</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Current maturities of notes and debentures	\$ 714.2	\$ 596.9
Current obligations under capital leases	39.1	42.8
Accounts payable	2,151.5	1,759.4
Accrued salaries and wages	526.1	426.4
Income taxes	124.2	270.3
Other accrued liabilities	708.8	696.3
Total current liabilities	<u>4,263.9</u>	<u>3,792.1</u>
Long-term debt:		
Notes and debentures	4,961.2	5,469.7
Obligations under capital leases	644.1	654.0
Total long-term debt	<u>5,605.3</u>	<u>6,123.7</u>
Deferred income taxes	223.1	463.6
Accrued claims and other liabilities	744.9	691.1
Total liabilities	10,837.2	11,070.5
Commitments and contingencies		
Stockholders' equity:		
Total stockholders' equity	<u>4,919.7</u>	<u>4,306.9</u>
Total liabilities and stockholders' equity	<u>\$ 15,756.9</u>	<u>\$ 15,377.4</u>

SAFEWAY INC. AND SUBSIDIARIES CONSOLIDATED STATEMENTS OF CASH FLOWS <i>(In millions)</i>			
	52 WEEKS 2005	52 WEEKS 2004	53 WEEKS 2003
OPERATING ACTIVITIES:			
Net income (loss)	\$ 561.1	\$ 560.2	\$ (169.8)
Reconciliation to net cash flow from operating activities:			
Net cash flow from operating activities	<u>1,881.0</u>	<u>2,226.4</u>	<u>1,609.6</u>
INVESTING ACTIVITIES:			
Cash paid for property additions	(1,383.5)	(1,212.5)	(935.8)
Proceeds from sale of property	105.1	194.7	189.0
Other	(35.1)	(52.5)	(48.2)
Net cash used by investing activities	<u>(1,313.5)</u>	<u>(1,070.3)</u>	<u>(795.0)</u>
FINANCING ACTIVITIES:			
Additions to short-term borrowings	\$ 13.0	\$ 11.2	\$ 2.6
Payments on short-term borrowings	(23.8)	(1.5)	(3.1)
Additions on long-term borrowings	754.5	1,173.5	1,592.0
Payments on long-term borrowings	(1,188.6)	(2,278.6)	(2,331.0)
Purchase of treasury stock	(1.5)	(0.4)	—
Dividends paid	(44.9)	—	—
Net proceeds from exercise of stock options	18.9	24.8	19.1
Other	5.5	(6.6)	(3.6)
Net cash flow used by financing activities	<u>(466.9)</u>	<u>(1,077.6)</u>	<u>(724.0)</u>
Effect of changes in exchange rates on cash	5.9	13.5	8.2
Increase in cash and equivalents	<u>106.5</u>	<u>92.0</u>	<u>98.8</u>
CASH AND EQUIVALENTS:			
Beginning of year	266.8	174.8	76.0
End of year	<u>\$ 373.3</u>	<u>\$ 266.8</u>	<u>\$ 174.8</u>
OTHER CASH INFORMATION:			
Cash payments during the year for:			
Interest	\$ 412.1	\$ 434.8	\$ 464.2
Income taxes, net of refunds	624.4	43.8	361.6
NON-CASH INVESTING AND FINANCING ACTIVITIES:			
Tax benefit from stock options exercised	\$ 9.1	\$ 17.4	\$ 13.6
Capital lease obligations entered into	27.1	35.9	113.2
Mortgage notes assumed in property additions	3.2	5.5	—

See accompanying notes to consolidated financial statements.

NOTE E: Lease Obligations

Approximately 62% of the premises that the Company occupies are leased. The Company had approximately 1,600 leases at year-end 2005, including approximately 225 that are capitalized for financial reporting purposes. Most leases have renewal options, some with terms and conditions similar to the original lease, others with reduced rental rates during the option periods. Certain of these leases contain options to purchase the property at amounts that approximate fair market value.

As of year-end 2005, future minimum rental payments applicable to non-cancelable capital and operating leases with remaining terms in excess of one year were as follows (in millions):

	CAPITAL LEASES	OPERATING LEASES
2006	\$ 105.7	\$ 426.1
2007	104.3	410.6
2008	103.9	397.3
2009	94.7	359.9
2010	86.1	330.2
Thereafter	875.0	2,645.9
Total minimum lease payments	1,369.7	\$ 4,570.0
Less amounts representing interest	(686.5)	
Present value of net minimum lease payments	683.2	
Less current obligations	(39.1)	
Long-term obligations	\$ 644.1	

Amortization expense for property under capital leases was \$43.0 million in 2005, \$43.4 million in 2004 and \$35.4 million in 2003. Accumulated amortization of property under capital leases was \$256.7 million at year-end 2005 and \$230.9 million at year-end 2004.

The following schedule shows the composition of total rental expense for all operating leases (in millions).

	2005	2004	2003
Property leases:			
Minimum rentals	\$ 422.4	\$ 406.9	\$ 411.4
Contingent rentals ⁽¹⁾	10.8	9.4	11.5
Less rentals from subleases	(30.2)	(28.1)	(31.4)
	403.0	388.2	391.5
Equipment leases	25.7	24.1	25.2
	\$ 428.7	\$ 412.3	\$ 416.7

(1) In general, contingent rentals are based on individual store sales.

Sample Placement Exam Answers ACCT611

QUESTION I (78 pts)

1.

Event/Transactions	Statement of Cash Flows
<i>Dr. Prepaid Expense 2000</i> <i>Cr. Cash 2000</i>	NI <i>0</i> - Increase in Prepaid <i>-2000</i> CFO <i>-2000</i> CFI CFF

2.

Event/Transactions	Statement of Cash Flows
<i>Dr. Advertising Expense 3000</i> <i>Cr. Prepaid Expense 3000</i>	NI <i>-3000</i> + Decrease in Prepaid <i>+3000</i> CFO <i>0</i> CFI CFF

Event/Transactions	Statement of Cash Flows
Dr. Amortization Expense 4000	NI -4000
Cr. Accumulated Amortization 4000 (or Intangible Assets)	+ Amortization +4000
	CFO 0
	CFI
	CFF

Event/Transactions		Statement of Cash Flows	
Dr. Retained Earnings	5000	NI	0
Cr. Cash	5000	CFO	0
		CFI	
		Dividends Paid	-5000
		CFF	-5000

Event/Transactions		Statement of Cash Flows	
<i>Dr. Interest Expense</i>	<i>4000</i>	NI	<i>-4000</i>
<i>Cr. Interest Payable</i>	<i>4000</i>	<i>+ Increase in Interest Pay</i>	<i>+4000</i>
		CFO	<i>0</i>
		CFI	
		CFF	

6.

Event/Transactions	Statement of Cash Flows
<i>Dr. PPE</i> 9000 <i>Cr. Cash</i> 9000	NI 0 CFO 0 <i>Purchase PPE</i> -9000 CFI -9000 CFF

7.

Event/Transactions	Statement of Cash Flows
<i>Dr. Revenue</i> 3000 <i>Cr. A/R</i> 3000 <i>Dr. Inventory</i> 2000 <i>Cr. COGS</i> 2000	NI -1000 <i>+ Decrease AR</i> +3000 <i>- Increase Inventory</i> -2000 CFO 0 CFI CFF

8.

Event/Transactions	Statement of Cash Flows
<i>Dr. Long Term Debt</i> 8000 <i>Cr. Cash</i> 8000	NI 0 CFO 0 CFI 0 <i>Repay Debt</i> -8000 CFF -8000

9.

Event/Transactions			Statement of Cash Flows	
<i>Dr. Unearned Revenue</i>	3000		NI	+2000
<i>Cr. Revenue</i>		3000	- Decrease in Unearned Rev	-3000
<i>Dr. Expense</i>	1000		CFO	-1000
<i>Cr. Cash</i>		1000	CFI	
			CFF	

10.

Event/Transactions			Statement of Cash Flows	
<i>Dr. Contributed Capital</i>	45000		NI	0
<i>Cr. Cash</i>		45000	CFO	0
			CFI	0
			- Reversal of issuance	-45000
			CFF	-45000

11.

Event/Transactions			Statement of Cash Flows	
<i>Dr. Administrative Expense</i>	7000		NI	-7000
<i>Cr. Cash</i>		3000	+ Increase in Accrued Exps	+4000
<i>Cr. Accrued Expenses</i>		4000	CFO	-3000
			CFI	
			CFF	

12.

Event/Transactions			Statement of Cash Flows	
<i>Dr. Cash</i>	8000		NI	0
<i>Cr. Unearned Revenue</i>		8000	+ Increase in Unearned Rev	+8000
			- Increase in Inventory	-2000
<i>Dr. Inventory</i>	2000		+ Increase in Accts Payable	+2000
<i>Cr. Accts Payable</i>		2000	CFO	+8000
			CFI	
			CFF	

13.

Event/Transactions			Statement of Cash Flows	
<i>Dr. Salary Expense</i>	10000		NI	-10000
<i>Cr. Salary Payable</i>		10000	+ Increase in Salary Payable	+10000
			CFO	0
			CFI	
			CFF	

QUESTION II (54 pts)

1. 2004

\$7,944 in financing cash flow was raised in 2004.

2. \$57,162

Total dividends = \$19,557 + \$19,069 + \$18,536 = \$57,162

3. \$5394

Proceeds from sale of long-lived assets	\$1,363
Add: Loss on disposal of long-lived assets	<u>+\$4,031</u>
Book value of long-lived assets sold	\$5,394

4. \$1,363 LOWER

5. \$0 NO CHANGE

All cash flow from the sale of long-lived assets is reflected in investing activities. The loss on the sale is a non-cash item that affects net income, but not cash flow. Therefore, it is added back in the operating activities section but does not result in higher operating cash flow.

6. \$16,224

	Warranty Liability
Beginning Balance	12,043
Less: warranties serviced	(15,000)
Warranty expense (plug)	16,224
Ending Balance	13,267

Alternatively, change in warranty liability from CFO (\$1,224) can be added to Warranties Serviced to obtain \$16,224.

7.

Retained Earnings

	Beginning Balance	\$437,269
	+ Net Income	13,284
- Dividends 19,557		
	Ending Balance	\$430,996

8. CFO

9. \$1,000,389

Accounts Receivable

Beginning Balance	100,378
Add: Sales on account	0
Less: Cash collected from A/R (plug)	(2,296)
Ending Balance	98,082

Cash revenues of \$998,093 + \$2,296 collected from A/R equals \$1,000,389 in total cash collected from customers.

10. \$1,000,389

Accounts Receivable

Beginning Balance	100,378
Add: Sales on account	499,046.5***
Less: Cash collected from A/R (plug)	(501,342.5)
Ending Balance	98,082

*** 998,093 x 50%

Cash revenues of \$499,046.5 + \$501,342.5 collected from A/R equals \$1,000,389 in total cash collected from customers.

11. Debit PPE 34,259
Credit Cash 34,259

12. \$616,534

Inventory

BB	175,982
Add: New Raw Mats.	649,274 (plug)
Less: COGS	(583,679)
EB	241,577

A/P

BB	69,394
Add: New Raw Mats.	649,274
Less: Cash paid for A/P	(616,534) (plug)
EB	102,134

Note: Here, all new inventory is assumed to be raw materials. But, any amount of raw materials up to \$649,274 may be assumed as long as the same figure is added to both inventory and A/P, and the remainder of new inventory is assumed to be paid directly in cash.

Sample Waiver Exam – Part 1 Answers ACCT611

QUESTION I: ACCOUNTS RECEIVABLES AND INVENTORIES

(18 pts assigned) (_____ pts scored)

1. 3520

See Note 12

2. \$ 515 INCREASED

Expense – Allowance Method	3520
Expense – Direct Write off Method	<u>3005</u>
Difference	515

3. \$0 NO CHANGE

$\Delta AR - BS$	15,122
$\Delta AR - CFS$	15,122

Since the reported changes are the same, the net effect of business acquisitions, etc. must have been zero.

4. \$807,999

$$\text{Sales} - \Delta AR = 823,121 - 15,122 = 807,999$$

Also

GROSS AR		
BB	65,318+2363	3005 Write-Offs
Sales	823,121 + 3520	
		807,999 Cash Collected (Plug)
EB	80,440 + 2878	

5. \$11,119

See Note 12, the column dealing with inventory

QUESTION II: LONG-LIVED ASSETS (20 pts assigned) (_____ pts scored)**1.** \$16,411

See Note 4

2. \$20,481

See SCF

3. \$1385

PPE, NET			
BB	50,502		
Additions	20,481		
		16,411	Depreciation
		1385	NBV Disposals - Plug
EB	53,187		

4. \$81 LOSS

Proceeds – NBV sold = 1304 – 1385 = 81

5. INDEFINITE

No change in NBV number on Balance Sheet. Also see Note 2

6. \$0 NO EFFECT**QUESTION III: LONG-TERM DEBT** (23 pts assigned) (_____ pts scored)**1.** \$ 75

See CFO

2. \$0

The change in the net book value of debt as reported in the footnote is completely explained by the discount amortization and the change in the reported NBV of the senior credit facility term loan.

3a. 3336

See beginning balance of Current maturities of long-term debt

3b. \$0 NO GAIN OR LOSS

There is never a gain or loss on the retirement of debt at maturity.

4a. 24,950

See SCF

Total cash paid to retire debt - cash paid to retire debt at maturity = cash paid to retire debt prior to maturity

$$28,286 - 3,336 = 24,950$$

4b. 24,950

LONG-TERM DEBT, NET			
		209,377	BB
724	debt reclassified as current	0	issued
24,950	nbv retired prior to maturity - PLUG	75	discount amortized
		183,778	EB

5. LOWER

See note 5

QUESTION IV: INVENTORY (21 pts assigned) (_____ pts scored)**1.** \$60.1

LESS

Since the question is asking for the effect in just one year, 2005, use change in the lifo reserve

2. \$69.1
$$\Delta \text{Lifo Reserve} = \text{price effect} - \text{liquidation effect}$$

$$60.1 = \text{price effect} - 9$$

$$\text{price effect} = 69.1$$

3. \$90.9

$$291.6 - 200.7 = 90.9$$

4. Name of "Cash flows from operating activities" line item	Amount and direction of effect (use +/- to indicate increase/decrease)
Net Income	$39.07 = 60.1 \times (1-.35)$
Adjustments to reconcile net income (loss) to cash flows	
Changes in Inventory	-60.1
Changes in Other Assets	
Changes in Other liabilities	$21.04 = 60.1 \times .35$
Net cash flows from operating activities of continuing operations	0

Sample Waiver Exam – Part 2 Answers ACCT611

QUESTION I: TAXES (35 pts assigned) (_____ pts scored)

1. Account	Debit	Credit
<i>Tax Expense</i>	146.5	
<i>Deferred Tax (Asset or Liability)</i>		4.1
<i>Tax payable</i>		142.4
<i>See the first tax table</i>		

2. \$376.6

Effective Tax Rate = Tax Expense/Earnings before Taxes

Earnings before taxes = Tax expense/ETR = $146.5 / .389 = 376.6$

ETR comes from the second tax table.

3. \$3.2 INCREASE

The journal entry for reducing the valuation allowance account is:

Allowance 3.2

Tax expense 3.2

4. \$66.376

TAX PAYABLE	
	20.3 BB
Payment 96.324	142.4 current tax expense (see table 1 in the tax footnote and the answer to question 1)
See the supplementary cash flow information	
	66.376 EB

5a. NO CHANGE

Tax exempt interest does not affect the statutory tax rate. The statutory tax rate is set by the taxing authorities.

5b. DECREASE

Tax exempt interest reduces the effective tax rate since it increases earnings before taxes but does not increase tax expense.

5c. NO CHANGE

Tax exempt interest represents a permanent difference. Deferred taxes arise from timing differences.

5d. NO CHANGE

Tax exempt interest represents a permanent difference. Deferred taxes arise from timing differences.

6a. FALSE

Notice that the deferred tax asset decreased in 2005, therefore there was a credit entry to the account. Hence, Tax expense must have been greater than Tax payable, hence financial income must have been greater than taxable income, hence more revenue must have been recorded for financial than for tax.

6b. TRUE

Since there is a deferred tax asset associated with the Unearned Revenue, cumulatively, more revenue has been recognized for tax than for financial.

6c. d. Change in deferred tax asset/.29 = $(18.9 - 16.9)/.29 = 6.9$

7. Net Deferred Tax Asset	INCREASE
Income Taxes Payable	NO EFFECT
Income Tax Expense	DECREASE

With a higher tax rate the tax shield associated with the deferred tax asset becomes more valuable, reducing *future* tax payments associated with present and past deferrals, resulting in lower tax expense this period.

QUESTION II: INTERCORPORATE INVESTMENTS (20 pts assigned) (_____ pts scored)

1. Account	Debit	Credit
Other Comprehensive Income	10.341	
Deferred Tax Liability (or Asset)	6.659	
Allowance for unrealized price changes		17
The credit entry is the change in the allowance account reported in the footnote. The entry to OCI is found in the statement of shareholders' equity. The entry to DTL is the plug.		

2. \$512.793

AVAILABLE FOR SALE – HISTORICAL COST			
BB	1064.5		
Purchases	833.593 from the SCF	512.793	Historical cost sold - plug
EB	1385.3		

3. \$847 REALIZED HOLDING GAIN

$$\text{Gain} = \text{Proceeds} - \text{Historical Cost} = 513.64 \text{ (from SCF)} - 512.793 = 847$$

4. \$17 SMALLER

$$\text{NIBT(trading)} = \text{NIBT(afs)} + \Delta \text{Allowance}$$

5. 39.2 %

$$(17 - 10.341)/17 = .392$$

$$(\text{Pretax effect} - \text{after tax effect})/\text{pretax effect}$$

6. \$12.9 SMALLER

$$21.5 \times (1 - .4) = \text{cumulative unrealized holding loss} \times \text{after tax rate}$$

QUESTION III: SHAREHOLDERS' EQUITY (15 pts assigned) (____ pts scored)

1. 114,716

$$\text{Number of shares issued} - \text{treasury} = 137,898 - 23,182 = 114,716$$

2. a. \$27.33

$$633,375 / 23,173 = \$27.33$$

b. Account	Debit	Credit
Cash	750	
APIC		116.625
Treasury Shares		633.375

3. a. \$42,506,420

$$\begin{aligned} &\text{Basic EPS} \times (\text{weighted average number of shares} - \text{Basic}) \\ &.38 \times (118,038,000 - 6,179,000) = \$42,506,420 \end{aligned}$$

b. \$.34

$$(50,000 - 10,000) / 118,038 = .34$$

QUESTION IV: LEASES (29 pts assigned) (____ pts scored)

1. OPERATING

None of the criteria for capital leases hold

2. Account	Debit	Credit
Interest expense	66.6	
Current maturities of leases	39.1	
Cash		105.7
The cash payment and the current maturities come from the lease footnote		

3. 9.7 %

$$\text{Interest expense/net book value of liability} = 66.6 / 683.2 = 9.7\%$$

4. SMALLER by \$492.7

$$\text{Interest expense (capital lease)} + \text{operating lease payment} = 66.6 + 426.1 = 492.7$$

5. NO EFFECT

6. SMALLER by \$39.1

The effect is the principal payment

7. \$4.6

LEASE ASSET – NBV			
BB	773.8 – 230.9	4.6	retirements - plug
New leases	27.1	43	amortization expense
EB	779.1 – 256.7		

8. Account	Debit	Credit
<i>PPE</i>		
<i>Long Term Lease Obligations</i>	3589	3589
<i>Long Term Lease Obligation</i>		
<i>Current Portion of Lease Obligation</i>	67.2	67.2
<i>Interest Expense</i>		
<i>Current Portion of Lease Obligation</i>	358.9	
<i>Cash</i>	67.2	426.1
<i>Amortization Expense</i>		
<i>Accumulated Amortization</i>	358.9	3589

b. GREATER

Cash flow from operations would be greater because instead of subtracting the entire lease payment you would only be subtracting the principal payment

Corporate Finance (FNCE611/612)

PLACEMENT/WAIVER EXAM–PART 1

■ Instructions

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2. This exam is being administered under the University's rules for academic conduct; the Code of Academic Integrity applies.
3. The exam consists of 5 multiple choice questions and 4 essay questions.
4. Use the white spaces (and backs of pages) in this question booklet as scratch paper for the multiple choice questions. Your final answers should be indicated **with a pen** in the appropriate boxes on page 1 of your answer sheet booklet.
5. Write your answers to the essay questions in the answer sheet booklet. You can use a pen or a pencil. If you need more answer sheets, you can request them, and they will be provided for you. *Do not use the backs of answer sheets, since these back pages will not be graded.*
6. IMPORTANT: Print your name and Penn ID number on the first page of your answer sheet booklet.
7. This is an open-book exam, i.e. you are free to use any course material. You are allowed to use a pocket calculator. Laptop computers and cell phones are not allowed.
8. You have two hours. The time left in the exam will be announced periodically. If you finish early, you can quietly hand in your answer sheet booklet and leave, *unless there is less than ten minutes left in the exam.*
9. **Please stop writing when requested to. There will be a penalty of 20 points for the people who don't.**
10. Remain seated until all the answer sheet booklets (not just yours) have been collected.

PART I: MULTIPLE CHOICE QUESTIONS (Total points: 25)

*INSTRUCTIONS: A correct answer to each of these questions is worth 5 points. An incorrect answer is worth 0. Also, for each question that you choose not to answer, you get 1 point. If you do choose to answer, write your answer **clearly** in the appropriate box on page 1 of your Answer Sheet Booklet. Your answers should be **capital** letters written with a **pen**. An empty box will be interpreted as a “no answer.”*

1. A 10-year annuity paying \$ x at the beginning of every year (i.e. the first of ten payments is made today) is worth the same (today) as an annuity of \$300 payable every 6 months for 10 years (20 payments), the first payment of which is due 66 months from now. If the annual interest rate (compounded annually) is 3%, find x .

a. \$232.73	d. \$508.11
b. \$502.48	e. \$521.42
c. \$506.23	

2. A machine costing \$3,000 must be replaced at the end of 8 years. The resale value of the machine at the time of replacement is \$600. At what annual discount rate (compounded annually) would it be equally economical to use a similar machine costing \$4,000 with a life of 8 years and a resale value of \$1,900? (Assume that there is no taxes.)

a. 2.4%	d. 3.3%
b. 2.7%	e. 3.6%
c. 3.0%	

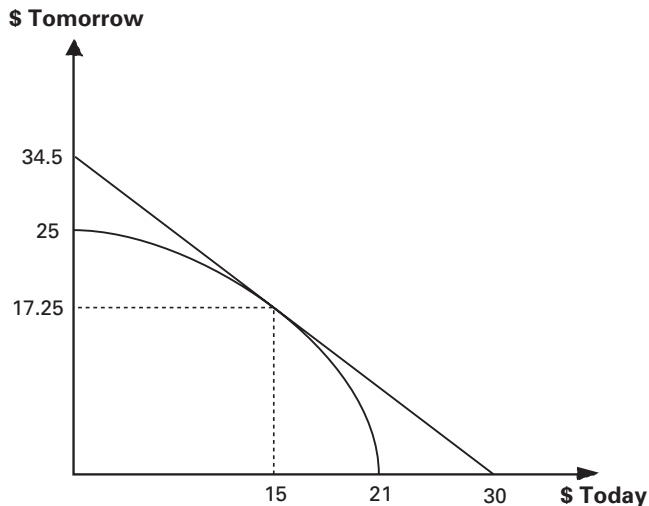
3. What is the present value of 15 payments of \$100 each received every 18 months (the first one occurring in 18 months from now), if the annual discount rate (compounded annually) is 9%?

a. \$620.43	d. \$951.28
b. \$875.56	e. \$1,209.10
c. \$930.61	

4. Corporate managers can maximize shareholder wealth by choosing positive NPV projects because:

a. all investors have the same preferences.
b. the unhappy shareholders can sell off their shares.
c. given the existence of financial markets, investors will be satisfied with the same real investment decisions regardless of personal preferences.
d. managers are wiser than shareholders regarding investments.
e. none of the above.

5. In the figure below, the sloping straight line represents the opportunities for investment in the capital market, and the solid curved line represents the opportunities for investment in plant and machinery (real assets). The company's only asset at present is \$21 million in cash.



Note that the figure is not drawn to scale, and that all the numbers are in millions.

Let I denote the optimal amount that should be invested in real assets, and r the interest rate in capital markets. Calculate I/r .

- a. 3.2 million d. 40 million
- b. 12 million e. 60 million
- c. 32 million

PART II: ESSAY QUESTIONS (Total points: 75)

INSTRUCTIONS: Each of the following questions is to be answered in the Answer Sheet Booklet. You can use a pen or a pencil. If you need more answer sheets, you can request them, and they will be provided for you. **Do not use the backs of answer sheets**, since these back pages will not be graded. The number of points for each question is indicated in parentheses at the beginning of the question. In answering these questions, make sure to show all your calculations; in particular, **no points will be given for calculator shortcuts**.

1. (20 points) Every year, you receive your entire annual salary at the end of the year. This year, your end-of-year salary will be \$50,000 (in nominal terms). In real terms, you expect your salary to increase at a rate of 2% per year in the future.

You have decided to start saving for retirement by putting money in a savings account. You plan to retire in 35 years, and you expect to live for 25 years after that. You assess that a reasonable lifestyle during those 25 years will require you to have, at the end of every year, a disposable income of \$25,000 in real terms (i.e. the same purchasing power as \$25,000 today). The nominal interest rate on your savings account is 8%, and it is expected to stay at that rate forever. The real interest rate is also expected to stay at its current level of 3.5%.

- a.** What is the inflation rate?
- b.** How much money (in nominal terms) will you need to have in your savings account when you retire, in 35 years (end of year 35), in order to be able to enjoy the lifestyle that you find reasonable? *HINT: First calculate the amount that you will need in real terms.*
- c.** Suppose that you will start saving for retirement at the end of the current year. Suppose further that you plan to make 35 deposits (one at the end of every year). All deposits are a fixed fraction x of your salary. Find the fraction x that will allow you to reach your “reasonable lifestyle” objective. *HINT: You will need to make use of the growing annuity formula.*
- 2.** (15 points) You are a financial analyst for a company that is considering a new project. If the project is accepted, it will use a fraction of a storage facility that the company already owns but currently does not use. The project is expected to last 10 years, and the annual discount rate is 10% (compounded annually).
- You research the possibilities, and find that the entire storage facility can be sold for \$100,000 and a smaller (but big enough) facility can be acquired for \$40,000. The book value of the existing facility is \$60,000, and both the existing and the new facilities (if it is acquired) would be depreciated straight line over 10 years (down to a zero book value). The corporate tax rate is 40%. What is the opportunity cost of using the existing storage capacity? *HINT: Think about what you would gain and lose if you did not.*
- 3.** (15 points) You own a rental building in the city and are interested in replacing the heating system. You are faced with the following alternatives:
- a.** A solar system, which will cost \$12,000 to install and \$500 at the end of every year to run, and will last forever (assume that your building will too).
- b.** A gas-heating system, which will cost \$5,000 to install and \$1,000 at the end of every year to run, and will last 20 years.
- c.** An oil-heating system, which will cost \$3,500 to install and \$1,200 at the end of every year to run, and will last 15 years.
- If your opportunity cost of capital (discount rate) is 10%, which of these three options is best for you?

4. (25 points) The following bonds are traded in a well functioning market:

BOND	TYPE	FACE VALUE	COUPON	MATURITY	PRICE
A	Zero Coupon Bond	\$100	—	1 year	\$92.00
B	Coupon Bond	\$100	8%	2 years	\$101.32

- a. Assuming that the coupon bond (bond B) makes only annual payments, what discount factors (DF_1 , DF_2) are imbedded in these prices? *NOTE: Show all your calculations; no points will be given for answers found by a sophisticated calculator.*
- b. What are the 1-year, and 2-year spot rates (r_1 and r_2)?
- c. Suppose that you would like to purchase a two-year coupon bond with a face value of \$10,000 and a coupon rate of 6% (with annual coupon payments). Since such a bond is not traded in this economy, what portfolio of bonds A and B could you form to satisfy your needs (i.e. how can you replicate this bond using the original two bonds). *NOTE: Make sure to describe that portfolio clearly, i.e. what you are buying/selling.*
- d. What is the exact yield to maturity on
 - i. bond A;
 - ii. bond B.

NOTE: Again, show all your calculations; no points will be given for answers found by a sophisticated calculator. In particular, you will need to use the following formula for the roots of $ax^2 + bx + c = 0$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

Your answers should have at least two decimals, like 9.53%.

Corporate Finance (FNCE611/612)

PLACEMENT/WAIVER EXAM–PART 2

■ Instructions

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3. The exam consists of 5 multiple choice questions and 4 essay questions.
4. Write all of your answers in the blue booklets. If you need more booklets, you can request them, and they will be provided for you.
5. You must cross out anything that you do not wish to have marked. For the multiple choice questions, please write your letter answers **with a pen**. (You can do your calculations in either pen or pencil. The calculations will not be marked, only the letter answer, so no partial credit is given). For the essay questions, you may use either a pen or a pencil; partial credit may be given.
6. **Important:** Print your name and Penn ID number on the first page of your answer sheet booklet. Also indicate which section of the course you attend, so I can return your exam in the proper section.
7. This is an open-book exam, i.e., you are free to use any course material. You are allowed to use a pocket calculator. Laptop computers and cell phones are not allowed.
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9. **Please stop writing when requested to. There will be a penalty of 20 points for the people who don't.**
10. Remain seated until **all** the answer sheet booklets (not just yours) have been collected.

PART I: MULTIPLE CHOICE QUESTIONS (Total points: 25)

INSTRUCTIONS: A correct answer to each of these questions is worth 5 points. An incorrect answer is worth 0. Also, for each question that you choose not to answer, you get 1 point. If you do choose to answer, write your answer **clearly** on page 1 of your blue booklet. Your answers should be **capital** letters written with a **pen**. Only the final answer will be marked and there shall be no partial credit for the multiple choice questions.

1. (5 points) Suppose that the price of the stock is S_0 , and its annual volatility is σ . Suppose also that the annual riskfree rate is r_f . According to Black-Scholes, what is the price of a European put option with a strike price of X maturing in T years? NOTE: In the answers below, we use

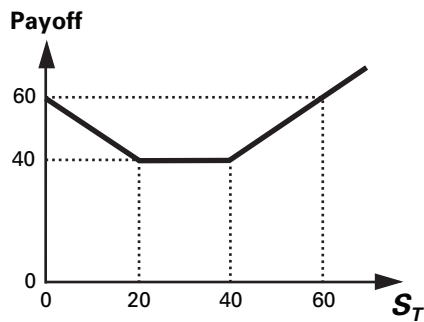
$$x = \frac{\log\left(\frac{S_0}{X/(1+r_f)^T}\right)}{\sigma\sqrt{T}} + \frac{1}{2}\sigma\sqrt{T}.$$

- a. $\frac{X}{(1+r_f)^T} [1 - N(x - \sigma\sqrt{T})] - S_0 [1 - N(x)]$
- b. $S_0 N(x) - \frac{X}{(1+r_f)^T} N(x - \sigma\sqrt{T})$
- c. $S_0 N(x - \sigma\sqrt{T}) - \frac{X}{(1+r_f)^T} N(x)$
- d. $S_0 [1 - N(x)] - \frac{X}{(1+r_f)^T} [1 - N(x - \sigma\sqrt{T})]$
- e. $S_0 [1 - N(x - \sigma\sqrt{T})] - \frac{X}{(1+r_f)^T} [1 - N(x)]$

2. (5 points) Which of the following statements are true?

- I. In a perfect capital market, it is advantageous for the firm to issue debt (vs. equity) to finance a project, because the cost of debt (r_D) is always smaller than the cost of equity (r_E).
 - II. The reason that Modigliani and Miller's Proposition I does not hold in the presence of corporate taxes is because levered firms pay less taxes than identical unlevered firms.
 - III. Equity financing is always better than debt financing when the personal tax rate on equity income (t_E) is smaller than the personal tax rate on interest income (t_D).
- a. I and II
 - b. I and III
 - c. II and III
 - d. I, II and III
 - e. fewer than two statements are true.

3. (5 points) If a firm borrows \$50 million for one year (i.e., the firm is levered for one year only) at an interest rate of 9%, what is the present value of the interest tax shield? Assume that there are no personal taxes, and that the corporate tax rate is 35%.
- a. \$50.000 million d. \$1.575 million
b. \$17.500 million e. \$1.445 million
c. \$4.128 million
4. (5 points) Suppose that you would like to take a position that will give you the following payoff at time T , as a function of the stock price S_T at that time:



Which of the following strategies will give you this position (assume that all the call and put options are European options maturing at T , and are written on the given stock)?

- I. Buy 1 put with a strike price of 60, buy 1 call with a strike price of 40, and buy 1 call with a strike price of 20.
- II. Buy 1 call with a strike price of 40, buy 1 put with a strike price of 20, and lend (at the riskfree rate) the present value of \$40 deliverable at time T .
- III. Buy 1 put with a strike price of 40, buy 1 put with a strike price of 20, and buy 1 share of the stock.
- a. I and II d. I, II and III
b. I and III e. fewer than two positions will give you the desired payoff.
c. II and III
5. (5 points) The Hifalutin Corporation has no debt in its capital structure, and the expected rate of return on its equity is 15%. There are 300,000 shares outstanding. The company has expected annual pre-tax earnings of \$3 million in perpetuity. The corporate tax rate is 40%. If Hifalutin announces that it will issue \$3.75 million worth of perpetual debt and use the entire proceeds to buy back some stocks, what will be its new share price? (Ignore personal taxes.)
- a. 40.00 d. 50.00
b. 45.00 e. 52.50
c. 48.50

PART II: ESSAY QUESTIONS (Total points: 75)

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1. (20 points total) Stiphla Inc.'s real assets are expected to generate earnings before interest and taxes (EBIT) of \$102,000 at the end of every year in perpetuity. The firm is currently financed by 50,000 shares each worth \$6.11 and by \$130,000 worth of perpetual debt issued at a rate of 12%. The corporate tax rate is 35%. Ignore personal taxes and bankruptcy costs.

- a. (2 points) What is the current total firm value of Stiphla Inc.?
- b. (3 points) What is the current expected return on Stiphla's equity?
- c. (2 points) What is Stiphla's weighted average cost of capital (WACC)?
- d. (2 points) Show that the value of the firm can be obtained by discounting its after-tax earnings at the weighted average cost of capital.

Janine Finch, the CFO of the company, has just found out that Stiphla could issue an additional \$130,000 worth of perpetual debt to buy back some equity. However, because the new debt will be junior to the original debt, Stiphla will have to pay a rate of 14% on that new debt.

- e. (2 points) What is the value of the firm after it goes ahead with the new debt issue?
- f. (4 points) What is the new expected return on the firm's equity?
- g. (2 points) Explain why the shareholders are better off (in terms of their total wealth).
- h. (3 points) What is Stiphla's new weighted average cost of capital (WACC)?

- 2.** (10 points total) Firms A and B are both unlevered. The shares of both companies are currently trading at \$100, and both offer an annual pre-tax return of 10%. In the case of firm A, the return is entirely in the form of a dividend yield (i.e., the company pays a regular annual dividend of \$10 a share). In the case of firm B, the return comes entirely as capital gain (the shares appreciate by 10% a year). Suppose that an investor buys a share of each firm today, and plans to sell them in 10 years. Suppose that dividends and capital gains are both taxed at 30%.
- (5 points) What is the annual after-tax yield (rate of return) on firm A's share over the 10-year period?
 - (5 points) What is the annual after-tax yield (rate of return) on firm B's share over the 10-year period?
- 3.** (25 points total) The Jack & Diane (JD) Corporation is considering a new 5-year project. Since this project is very different from JD's current operations, the adjusted present value will be used to value the project.
- The project requires an initial investment of \$750,000 in new assets, which will be depreciated straight-line to 0 over the project's 5-year life. These assets will be worthless in five years, i.e., they will not be resold. (Assume that the depreciation tax shields can be discounted at the project discount rate). Each year for five years, the project is expected to generate pre-tax revenues of \$600,000 and to require pre-tax costs of \$240,000. The entire project will be financed through a 5-year bank loan with an annual rate of 10%. The principal on the loan will be repaid in equal installments of \$150,000 each (i.e., each year, the company pays \$150,000 in principal, and pays the interest on the outstanding loan). It is estimated that the pre-tax costs (payable at time zero) of negotiating the loan will be 4% of the amount borrowed.
- The project's risk is very similar to the risk of Tommy & Gina (TG) Inc.'s assets. This firm is currently financed by 100,000 shares worth \$12.50 each, and \$750,000 worth of debt. The beta of TG's stock is 1.5, and the company borrows at a rate of 11%. The riskfree rate in the economy is 8%, and the expected return on the market is 18%. The current corporate tax rate is 45% (assume that it applies to both JD and TG). Ignore personal taxes.
- (8 points) What would be the appropriate discount rate for the project, if it were all-equity financed?
 - (17 points) What is the adjusted present value of the project?

4. (20 points total) During the upcoming year, the stock price of Delinquent Jesters Inc. (DJ) is expected to go up to \$290 or down to \$170 with equal probabilities. The beta of the stock is equal to 0.75. The annual riskfree rate is 10.5%, and the expected annual return on the market is 16.5%. You are interested in replicating and pricing a European call option on DJ's stock. The option has a strike price of \$212, and will mature in one year.
- a. (4 points) What is the current price of DJ's stock?
 - b. (6 points) Using the stock and borrowing/lending (at the riskfree rate), form a portfolio that will replicate the call option. How many shares of DJ will you buy/sell, and how much money will you borrow/lend?
 - c. (3 points) Use the portfolio derived in part (b) to price the call option.
 - d. (4 points) What is the beta and expected return of the call option?
 - e. (3 points) Using the result from part (d), show that the price of the call option found in part (c) can also be derived by discounting the expected cash flow of the option.

Placement/Waiver Exam-Part 1 Answers FNCE611/612

PART I: Multiple Choice Questions

1. **C.** We must have

$$x \ddot{a}_{\overline{103}\%} = \frac{300}{(1.03)^5} a_{\overline{20}\hat{r}},$$

where the equivalent semiannual interest rate $\hat{r}$ must satisfy

$$(1 + \hat{r})^2 = 1.03 \quad \Rightarrow \quad \hat{r} = 1.4889157\%.$$

Since $\ddot{a}_{\overline{103}\%} = 8.7661089$ and $a_{\overline{20}\hat{r}} = 17.1874132$, we find $x = 506.23$.

2. **D.** The interest rate r must satisfy:

$$\begin{aligned} -3,000 + \frac{600}{(1+r)^8} &= -4,000 + \frac{1,900}{(1+r)^8} \\ \Leftrightarrow 1,000 &= \frac{1,300}{(1+r)^8} \\ \Leftrightarrow r &= \left(\frac{1,300}{1,000} \right)^{1/8} - 1 = 3.33\%. \end{aligned}$$

3. **A.** First, let us find the equivalent 18-month rate $\hat{r}$:

$$(1.09)^{3/2} = 1 + \hat{r} \quad \Rightarrow \quad \hat{r} = 13.79934\%.$$

The present value PV of the annuity is therefore

$$PV = 100a_{\overline{15}\hat{r}} = \frac{100}{0.1379934} \left[1 - \frac{1}{(1.1379934)^{15}} \right] = 620.43.$$

4. **C.** See section I.3.1 of the lecture notes.

5. **D.** The amount invested in real assets is given by

$$I = 21 \text{ million} - 15 \text{ million} = 6 \text{ million}.$$

The slope of the straight line (capital market investment opportunities) is $-(1+r)$, that is

$$-(1+r) = -\frac{34.5}{30} \quad \Rightarrow \quad r = 15\%.$$

Therefore, $I/r = 40$ million.

PART II: Essay Questions

1. (a) (4 points) The inflation rate is given by

$$i = \frac{1+r}{1+R} - 1 = \frac{1.08}{1.035} - 1 = 4.3478261\%.$$

- (b) (8 points) At the end of 35 year, the present value PV_R in real terms of your retirement income is

$$PV_R = 25,000a_{\overline{35}|3.5\%} = \frac{25,000}{0.035} \left[1 - \frac{1}{(1.035)^{35}} \right] = 412,037.86.$$

Since this amount is in real terms, we need to inflate it for 35 years. Therefore, the nominal amount PV_n needed in the account in 35 years is

$$PV_n = 412,037.86(1.043478261)^{35} = 1,827,495.55.$$

- (c) (8 points) The present value at time 0 of the amount needed in the account in 35 years is

$$PV_0 = \frac{412,037.86}{(1.035)^{35}} = 123,601.83.$$

Alternatively, we could do the calculations in nominal terms:

$$PV_0 = \frac{1,827,495.55}{(1.08)^{35}} = 123,601.83.$$

The present value of your 35 contributions should be equal to this amount. In real terms:

$$123,601.83 = \frac{50,000x/(1.043478261)}{0.035 - 0.02} \left[1 - \left(\frac{1.02}{1.035} \right)^{35} \right] \Rightarrow x = 9.6713\%.$$

Again, the calculations could have been done in nominal terms, in which case they grow at $g = (1.02)(1+i) - 1 = 6.4347826\%$:

$$123,601.83 = \frac{50,000x}{0.08 - 0.064347826} \left[1 - \left(\frac{1.064347826}{1.08} \right)^{35} \right] \Rightarrow x = 9.6713\%.$$

2. (15 points) By selling the existing facility, the company would

- gain \$100,000 from the sale;
- pay a tax of

$$(\$100,000 - \$60,000)(40\%) = \$16,000$$

on the capital gain resulting from this sale;

- lose the yearly depreciation tax shield of

$$\frac{\$60,000}{10}(40\%) = \$2,400$$

for 10 years.

By acquiring the new facility, the company would

- pay \$40,000 to buy the facility;
- gain a yearly depreciation tax shield of

$$\frac{\$40,000}{10}(40\%) = \$1,600$$

for 10 years.

The present value PV of all these gains and losses represents the opportunity cost of using the existing storage capacity:

$$\begin{aligned} PV &= 100,000 - 16,000 - 2,400a_{\overline{10}|0.10} - 40,000 + 1,600a_{\overline{10}|0.10} \\ &= 100,000 - 16,000 - \frac{2,400}{0.10} \left[1 - \frac{1}{(1.10)^{10}} \right] - 40,000 + \frac{1,600}{0.10} \left[1 - \frac{1}{(1.10)^{10}} \right] \\ &= 39,084.35. \end{aligned}$$

3. (15 points) There are two equivalent approaches for solving this problem: (i) repeat the cash flows to infinity (which is already done for alternative A), and calculate and compare the net present values; (ii) Calculate and compare the equivalent annual costs of the three alternatives. Let us use the second approach.

A. The present value of the costs is

$$PV_A = 12,000 + \frac{500}{0.10} = 17,000.$$

The equivalent annual cost C_A must solve

$$17,000 = \frac{C_A}{0.10} \Rightarrow C_A = 1,700.$$

B. The present value of the costs is

$$PV_B = 5,000 + \frac{1,000}{0.10} \left[1 - \frac{1}{(1.10)^{20}} \right] = 13,513.56.$$

The equivalent annual cost C_B must solve

$$13,513.56 = \frac{C_B}{0.10} \left[1 - \frac{1}{(1.10)^{20}} \right] \Rightarrow C_B = 1,587.30.$$

C. The present value of the costs is

$$PV_C = 3,500 + \frac{1,200}{0.10} \left[1 - \frac{1}{(1.10)^{15}} \right] = 12,627.30.$$

The equivalent annual cost C_C must solve

$$12,627.30 = \frac{C_C}{0.10} \left[1 - \frac{1}{(1.10)^{15}} \right] \Rightarrow C_C = 1,660.16.$$

Therefore, alternative B is the best alternative, since it involves the lowest costs.

4. (a) (6 points) Since the price of every bond must be the sum of its discounted cash flows, the discount factors must solve:

$$100DF_1 + \quad = 92.00 \quad (1)$$

$$8DF_1 + 108DF_2 = 101.32 \quad (2)$$

Using (1), we have $DF_1 = 0.92$. Using this value for DF_1 in (2), we get

$$DF_2 = \frac{101.32 - 8(0.92)}{108} = 0.87.$$

- (b) (4 points) The discount factors can be written as

$$DF_t = \frac{1}{(1 + r_t)^t}.$$

Therefore,

$$r_1 = \frac{1}{DF_1} - 1 = 8.69565\%, \quad \text{and}$$

$$r_2 = \frac{1}{DF_2^{1/2}} - 1 = 7.21125\%.$$

- (c) (7 points) The bond that you would like to purchase will pay 6%(\$10,000) = \$600 at the end of the first year, and \$10,600 at the end of the second year. Let us form a portfolio containing a quantity n_A of bond A, and n_B of bond B. We would like this portfolio to pay \$600 at the end of the first year, and \$10,600 at the end of the second year. Mathematically we would like n_A and n_B to satisfy:

$$100 n_A + 8 n_B = 600 \quad (1)$$

$$+ 108 n_B = 10,600 \quad (2)$$

Using (2), we have $n_B = \frac{10,600}{108} = 98.148148$. Using this value for n_B in (1), we get

$$n_A = \frac{600 - 8(98.148148)}{100} = -1.851852.$$

Therefore, the portfolio that would replicate the 6% coupon bond would consist in selling 1.851852 units of bond A, and buying 98.148148 units of bond B.

- (d) (i) (3 points) The yield on a zero-coupon bond with a maturity of t years is simply the t -year spot rate. Therefore the yield y_A of bond A is $y_A = r_1 = 8.69565\%$.
(ii) (5 points) The yield to maturity y_B for bond B has to satisfy

$$101.32 = \frac{8}{1 + y_B} + \frac{108}{(1 + y_B)^2} \Leftrightarrow 108x^2 + 8x - 101.32 = 0, \quad \text{where } x = \frac{1}{1 + y_B}.$$

Solving for x using the quadratic equation formula, we find

$$\frac{1}{1 + y_B} = x = \frac{-8 \pm \sqrt{(8)^2 - 4(108)(-101.32)}}{2(108)} = 0.9327379.$$

Solving for y_B (ignoring the “minus” root, which has no economic meaning), we find $y_B = 7.26721\%$.

Placement/Waiver Exam-Part 2 Answers FNCE611/612

PART I: Multiple Choice Questions

1. **A.** We know from Black-Scholes that the price of a call option with strike X maturity T is

$$C_0 = S_0 N(x) - \frac{X}{(1+r_f)^T} N(x - \sigma\sqrt{T}).$$

We can then find the price of the put by using the put-call parity relationship:

$$\begin{aligned} P_0 &= C_0 - S_0 + \frac{X}{(1+r_f)^T} \\ &= S_0 N(x) - \frac{X}{(1+r_f)^T} N(x - \sigma\sqrt{T}) - S_0 + \frac{X}{(1+r_f)^T} \\ &= \frac{X}{(1+r_f)^T} [1 - N(x - \sigma\sqrt{T})] - S_0 [1 - N(x)]. \end{aligned}$$

2. **E.** (I) FALSE. In a perfect capital market, the capital structure of a firm does not affect its value. (II) TRUE. The advantage of debt financing comes from the very fact that less taxes are being paid. (III) FALSE. Equity financing is better if $(1-t_E)(1-t_c) > (1-t_D)$. This is not always the case when $t_E < t_D$: if t_c is large enough, the inequality goes the other way, and debt financing is more advantageous.
3. **E.** The interest payment at the end of the year is $0.09 \times 50 = 4.5$. This amount is expected to shield $0.35 \times 4.5 = 1.575$ of the firm's profits from taxes. The present value of this amount is $1.575/1.09 = 1.445$.
4. **C.** It can be shown graphically that the last two strategies will give you the desired position. The first one is incorrect for $S_T > 60$ (the slope after that point is 2, not 1, as desired).
5. **B.** The value of the unlevered company (before the debt issue) is

$$V_U = \frac{(1 - 0.4)3,000,000}{0.15} = 12,000,000.$$

The value of the levered company (after the debt issue) will be

$$V_L = V_U + t_c D = 12,000,000 + 0.4(3,750,000) = 13,500,000.$$

The new equity value will be

$$E = V_L - D = 13,500,000 - 3,750,000 = 9,750,000.$$

Letting n denote the number of shares repurchased and S the new price per share, we must have

$$\begin{aligned} nS &= 3,750,000 \\ (300,000 - n)S &= 9,750,000 \end{aligned}$$

Solving for n and S gives $n = 83,333.33$ and $S = 45$.

PART II: Essay Questions

1. (20 points total)

- (a) (2 points) We have $D_L = 130,000$ and $E_L = 50,000 \times 6.11 = 305,500$, so that $V_L = D_L + E_L = 435,500$.
- (b) (3 points) The value of the equity can be obtained by discounting the after-tax earnings that will be received by the shareholders:

$$E_L = \frac{(1 - t_c)(\text{EBIT} - r_D D_L)}{r_E}.$$

This implies

$$\begin{aligned} r_E &= \frac{(1 - t_c)(\text{EBIT} - r_D D_L)}{E_L} \\ &= \frac{(1 - 0.35)[102,000 - (0.12)(130,000)]}{305,500} \\ &= 18.38298\%. \end{aligned}$$

- (c) (2 points) Stiphla's weighted average cost of capital is

$$\begin{aligned} \text{WACC} &= (1 - t_c)r_D \frac{D_L}{V_L} + r_E \frac{E_L}{V_L} \\ &= (1 - 0.35)(0.12) \frac{130,000}{435,500} + (0.1838298) \frac{305,500}{435,500} \\ &= 15.22388\%. \end{aligned}$$

- (d) (2 points) The value of the firm can also be obtained as follows:

$$V_L = \frac{(1 - t_c)\text{EBIT}}{\text{WACC}} = \frac{(1 - 0.35)102,000}{0.1522388} = 435,500.$$

- (e) (2 points) Let us denote by primed variables all the quantities after the new debt issue. The firm's value will go up by the present value of its additional tax shields:

$$V'_L = V_L + t_c(D'_L - D_L) = 435,500 + 0.35(260,000 - 130,000) = 481,000.$$

- (f) (4 points) The equity is now worth

$$E'_L = V'_L - D'_L = 481,000 - 260,000 = 221,000.$$

As before, the value of the equity can be obtained by discounting the after-tax earnings that will be received by the shareholders:

$$E'_L = \frac{(1 - t_c)[\text{EBIT} - (0.12)(130,000) - (0.14)(130,000)]}{r'_E}.$$

This implies

$$\begin{aligned} r'_E &= \frac{(1 - t_c)[\text{EBIT} - (0.12)(130,000) - (0.14)(130,000)]}{E'_L} \\ &= \frac{(1 - 0.35)[102,000 - (0.12)(130,000) - (0.14)(130,000)]}{221,000} \\ &= 20.05882\%. \end{aligned}$$

- (g) (2 points) The shareholders are better off because their wealth went from \$305,500 (in equity only) to \$351,000 (\$221,000 in equity, and \$130,000 in cash from the debt issue).
- (h) (3 points) Stiphla's new weighted average cost of capital will be given by

$$\text{WACC}' = (1 - t_c)(12\%) \frac{130,000}{481,000} + (1 - t_c)(14\%) \frac{130,000}{481,000} + r'_E \frac{221,000}{481,000} = 13.78378\%.$$

Equivalently, the total debt of \$260,000 is issued at an average rate of $\frac{12\% + 14\%}{2} = 13\%$, so that

$$\text{WACC}' = (1 - t_c)(13\%) \frac{260,000}{481,000} + r'_E \frac{221,000}{481,000} = 13.78378\%.$$

Finally, the firm's weighted average cost of capital can also be found by using the fact that the firm's value is given by the after-tax earnings discounted at the WACC:

$$V'_L = \frac{(1 - t_c)\text{EBIT}}{\text{WACC}'} \Leftrightarrow \text{WACC}' = \frac{(1 - 0.35)102,000}{481,000} = 13.78378\%.$$

(10 points total)

- (a) (5 points) Every year, the investor receives \$10, which is taxed at 30%. So, after taxes, the investor receives \$7 each year. At the end of year 10, the investor will sell his share of firm A for \$100, and so will not have any capital gain. His annual after-tax return on his \$100, is therefore $7/100 = 7\%$.

- (b) (5 points) The investor will not receive any money until year 10, at which point he will sell his share of firm B for $100(1.10)^{10} = 259.37$. The capital gains of $259.37 - 100 = 159.37$ will then be taxed at 30%. Therefore, the annual after-tax rate of return r satisfies

$$(1+r)^{10} = \frac{259.37 - 0.30(159.37)}{100} \Leftrightarrow r = 7.781\%.$$

3. (25 points total) We are given $r_f = 0.10$, $r_m = 0.18$, and $t_c = 45\%$.

- (a) (8 points) Let us first calculate the expected return on TG's stock using the CAPM:

$$r_E = r_f + (r_m - r_f)\beta_E = 0.08 + (0.18 - 0.08)(1.5) = 0.23.$$

TG is financed with $100,000 \times \$12.50 = \$1,250,000$ of equity and $\$750,000$ of debt, i.e., $E = 1,250,000$, $D = 750,000$, $V = D + E = 2,000,000$, $D/V = 0.375$, and $E/V = 0.625$. This means that the present value of its tax shields is $t_c \times D = 0.45 \times 750,000 = 337,500$, and the value of its assets is

$$A = V - \text{PV}(\text{tax shields}) = 2,000,000 - 337,500 = 1,662,500.$$

In other words, a fraction $\frac{1,662,500}{2,000,000} = 0.83125$ of the firm's value comes from its assets, and a fraction $1 - 0.83125 = 0.16875$ comes from its tax shields. Since the firm's tax shields have the same risk as its debt, we have

$$\begin{aligned} 0.83125r_A + 0.16875r_D &= 0.375r_D + 0.625r_E \\ \Leftrightarrow 0.83125r_A + 0.16875(0.11) &= 0.375(0.11) + 0.625(0.23) \\ \Leftrightarrow r_A &= 0.2002. \end{aligned}$$

Since the project has the same risk as TG's assets, the appropriate discount rate is $r = r_A = 0.2002$.

Note that this rate could also have been calculated by unlevering TG's weighted average cost of capital (WACC). Indeed, TG's WACC is

$$\text{WACC}_L = (1-t_c)r_D \frac{D}{V} + r_E \frac{E}{V} = (1-0.45)(0.11)(0.375) + (0.23)(0.625) = 0.1664375.$$

Since $\text{WACC}_L = \text{WACC}_U (1 - t_c \frac{D}{V})$, we have

$$r_A = \text{WACC}_U = \frac{\text{WACC}_L}{1 - t_c \frac{D}{V}} = \frac{0.1664375}{1 - (0.45)(0.375)} = 0.2002.$$

- (b) (17 points) The adjusted present value (APV) of the project is given by

$$\begin{aligned} \text{APV} = & -750,000 \quad + \text{NPV}(\text{project}) \\ & + \text{PV}(\text{interest tax shields}) \\ & - \text{PV}(\text{after-tax issuance costs}). \end{aligned}$$

In each of the project's five years, the after-tax cash flows will be

$$\begin{aligned}
 \text{CF} &= (\text{after-tax profits}) + (\text{depreciation tax shields}) \\
 &= 360,000(1 - t_c) + t_c \frac{750,000}{5} \\
 &= 360,000(1 - 0.45) + 0.45(150,000) \\
 &= 265,500.
 \end{aligned}$$

Therefore, using the discount rate r calculated in part (a), we have

$$\text{NPV}(\text{project}) = 265,500a_{5|0.2002} = \frac{265,500}{0.2002} \left[1 - \frac{1}{(1.2002)^5} \right] = 793,613.59.$$

Note that it could also be argued that the depreciation tax shields should be discounted at a rate lower than r , since they are not directly part of the project. For example, we could discount them at $r_D = 10\%$, since the company will benefit from these tax shields in the same years that it will benefit from the interest tax shields. They are also often discounted at $r_f = 8\%$ in practice. In the first case you would then get

$$\text{NPV}(\text{project}) = 360,000(1 - 0.45)a_{5|0.2002} + 0.45(150,000)a_{5|0.10} = 847,725.53.$$

In the second case, you would get

$$\text{NPV}(\text{project}) = 360,000(1 - 0.45)a_{5|0.2002} + 0.45(150,000)a_{5|0.08} = 861,355.35.$$

The present value of the interest tax shields can be calculated using the following table:

Year	Debt outstanding at start of year	Interest	Interest tax shield
1	750,000	75,000	33,750
2	600,000	60,000	27,000
3	450,000	45,000	20,250
4	300,000	30,000	13,500
5	150,000	15,000	6,750

Therefore, we have

$$\text{PV}(\text{interest tax shields}) = \frac{33,750}{1.10} + \cdots + \frac{6,750}{(1.10)^5} = 81,621.89.$$

Finally, the after-tax issuance costs are

$$\text{PV}(\text{after-tax issuance costs}) = 4\% \times 750,000 \times (1 - 0.45) = 16,500.$$

The adjusted present value of the project is therefore

$$\text{APV} = -750,000 + 793,613.59 + 81,621.89 - 16,500 = 108,735.48.$$

4. (20 points total) We are given $\beta_s = 0.75$, $r_f = 0.105$, and $r_m = 0.165$.

(a) (4 points) Using the CAPM, the expected return on the stock is

$$r_s = r_f + (r_m - r_f)\beta_s = 0.105 + (0.165 - 0.105)(0.75) = 0.15.$$

We can find S_0 , the current price of the stock, by discounting the expected cash flow from the stock at r_s :

$$S_0 = \frac{290(0.5) + 170(0.5)}{1.15} = 200.$$

(b) (6 points) In the up state, the option will be exercised and will pay $\$290 - \$212 = \$78$. In the down state, the option will not be exercised; the payoff is therefore zero. Let us form a portfolio by buying Δ shares of DJ's stock, and by lending $\$B$. In the up (down) state, this portfolio pays $290\Delta + 1.105B$ ($170\Delta + 1.105B$). We want

$$\begin{aligned} 290\Delta + 1.105B &= 78; \\ 170\Delta + 1.105B &= 0. \end{aligned}$$

Solving for Δ and B , we find $\Delta = 0.65$ and $B = -100$. This means that the call option can be replicated by buying 0.65 shares of the stock, and borrowing \$100.

(c) (3 points) Since the portfolio has exactly the same payoff as the call option, its cost ($200\Delta + B$) should be the price of the call option in a well-functioning market:

$$C_0 = 200\Delta + B = 200(0.65) + (-100) = 30.$$

(d) (4 points) Since the call option is a portfolio of the stock and riskfree borrowing, the beta of the call option, β_c , is given by

$$\begin{aligned} \beta_c &= \frac{200(0.65)}{30}\beta_s + \frac{-100}{30}\beta_{r_f} \\ &= \frac{200(0.65)}{30}(0.75) + \frac{-100}{30}(0) \\ &= 3.25. \end{aligned}$$

The expected return r_c on the call option can then be obtained using the CAPM:

$$r_c = r_f + (r_m - r_f)\beta_c = 0.105 + (0.165 - 0.105)(3.25) = 0.30.$$

(e) (3 points) The expected payoff of the call option is $78(0.5) + 0(0.5) = 39$. The price of the option should therefore be

$$C_0 = \frac{39}{1 + r_c} = \frac{39}{1.30} = 30.$$

Macroeconomics and the Global Economic Environment (FNCE613)

SAMPLE EXAM 1

NAME

(IN BLOCK LETTERS)

Class time (CIRCLE ONE): 9:00 a.m. 10:30 a.m. 1:30 p.m.

DO NOT OPEN BOOKLET UNTIL TOLD TO BY PROCTOR

PLEASE DO NOT TURN THE PAGE UNTIL THE EXAM BEGINS.

1. This examination consists of 4 major parts. Altogether there are 11 pages (including this page). When the examination begins, **check immediately to make sure that you have all pages.**
2. PRINT your name LEGIBLY - IN BLOCK LETTERS - at the top of EVERY PAGE immediately after the exam begins. The exam pages will be separated after the exam ends, and it is important that your name be printed on every page. **YOU WILL RECEIVE A BONUS OF 1 POINT FOR EVERY PAGE THAT YOU WRITE YOUR NAME ON USING BLOCK LETTERS.**
3. CIRCLE your CLASS TIME at the top of this page. **YOU WILL RECEIVE ONE BONUS POINT FOR CIRCLING YOUR CLASS TIME AT THE TOP OF THIS PAGE.**
4. Answer all questions concisely in the space provided. If you need additional space to answer a question, use the back of the page **on which the question is typed**, and **indicate clearly on the front of the page** that part of the answer is on the back of the page.
5. This examination is a **closed-book, closed-notes exam**, except that you may use **two sheets of paper** (no larger than 8.5 inches by 11 inches) with anything you want to write on the front and back of these sheets.
6. You may use a calculator, but you may **NOT** use a computer or any other device with communication capability.
7. You will have 2 hours to complete this examination. When time is called at the end of the examination, you must **STOP WRITING IMMEDIATELY**. Heavy penalties will be assessed against students who are observed writing after time is called.

Grading: There are **264** points possible, plus there are 12 bonus points available for writing your name **IN BLOCK LETTERS** at the top of every page and for circling your section time at the top of this page.

QUESTION I. (104 points) Each of the following multiple choice questions is worth 4 points. Be sure to write the letter (a, b, c, d) of your response in the space indicated by “Answer _____”.

1. Automatic stabilizers Answer _____
 - a. lead to smaller government budget deficits during recessions than without these stabilizers.
 - b. reduce the variance of government budget balances.
 - c. are a step toward creating balanced budgets in recessions and booms.
 - d. lead to larger government budget deficits during recessions than without these stabilizers.

2. Which of the following does NOT shift the FE line to the left? Answer _____
 - a. a temporary decline in total factor productivity
 - b. a decrease in the future marginal product of capital
 - c. a decline in the labor force participation rate
 - d. a sudden reduction in the physical capital stock

3. An increase in foreign income that increases the home country's net exports at any given levels of output and real interest rate in the home country will Answer _____
 - a. shift the home country's FE line to the right.
 - b. decrease the real interest rate in the home country.
 - c. shift the home country's IS curve up and to the right.
 - d. shift the IS curve down and to the left in both countries.

4. A temporary decline in productivity would _____ output, _____ the real interest rate, and _____ the price level when prices adjust. Answer _____
 - a. reduce; reduce; reduce
 - b. reduce; increase; reduce
 - c. reduce; increase; increase
 - d. not affect; reduce; increase

5. The IS curve would unambiguously shift down and to the left if there were Answer _____
 - a. an increase in the government budget deficit.
 - b. an increase in net exports at any given combination of output and the real interest rate.
 - c. a decrease in both personal taxes and the corporate tax rate.
 - d. an increase in the corporate tax rate and a decrease in the expected future marginal product of capital.

6. An open-market purchase of bonds by the central bank Answer _____
a. initially leads to an excess supply of both money and bonds.
b. reduces monetary base.
c. reduces the government's budget deficit.
d. increases bond prices and reduces the interest rate at the initial level of output.
7. In a Keynesian economy, if banks increase the interest rate they pay on checking accounts, output would _____ and the real interest rate on nonmonetary assets would _____ in the short run. Answer _____
a. fall; increase
b. remain unchanged; increase
c. increase; increase
d. fall; decrease
8. If the IS/LM intersection is to the right of the FE line, the economy is in a _____, the price level will eventually _____, and the LM curve will then shift _____. Answer _____
a. recession; fall; downward
b. recession; rise; upward
c. boom; rise; upward
d. boom; fall; downward
9. Suppose that the intersection of the IS and LM curves is to the left of the FE line. What would happen to restore general equilibrium in the absence of any monetary or fiscal policy actions? Answer _____
a. Full-employment output would fall, shifting the FE line to the left.
b. Wealth would fall, shifting the LM curve upward and to the left.
c. The price level would fall, shifting the LM down and to the right.
d. The FE line would shift to the left and the IS curve would shift to the right.
10. Which of the following would shift the FE line to the right? Answer _____
a. A rightward shift of the labor supply curve
b. An increase in the expected future marginal product of capital
c. A credible plan to restore solvency to the Social Security system, which induces people to retire earlier
d. A burst of inflation resulting from a sharp increase in the growth rate of money

- 11.** In the classical model with misperceptions, an unanticipated decrease in the money supply would cause output to _____ and the price level to _____ in the short run. Answer _____
- a.** remain unchanged; increase
 - b.** increase; decrease
 - c.** increase; remain unchanged
 - d.** decrease; decrease
- 12.** An adverse productivity shock that increases both the expected rate of inflation and the natural rate of unemployment would Answer _____
- a.** shift the short-run Phillips curve upward and rightward and shift the long-run Phillips curve rightward.
 - b.** shift the short-run Phillips curve upward and rightward and leave the long-run Phillips curve unchanged.
 - c.** leave both the short-run Phillips curve and long-run Phillips curve unchanged.
 - d.** twist the short-run Phillips curve and the leave the long-run Phillips curve unchanged.
- 13.** A high value of the sacrifice ratio indicates that Answer _____
- a.** the future marginal product is low, so that it takes a large increase in capital investment to increase future output.
 - b.** a large part of federal government spending is devoted to the military.
 - c.** consumers have a high rate of time preference and hence do not like to defer consumption to the future.
 - d.** there is a large cost, in terms of lost output, associated with a reduction in the rate of inflation.
- 14.** Over the period of time from the beginning of a hyperinflation to the end of the hyperinflation Answer _____
- a.** governments tend to run budget surpluses.
 - b.** the average rate of inflation is higher than the average rate of monetary growth.
 - c.** the average rate of inflation equals the average of monetary growth.
 - d.** the average rate of inflation is somewhat lower than the average rate of monetary growth.

- 15.** From January 2001 to May 2012, the Canadian dollar/euro exchange rate changed from 1.41 Canadian dollars/euro to 1.30 Canadian dollars/euro, while the Japanese yen/euro exchange rate changed from 109.5 yen/euro to 106.1 yen/euro. Thus, Answer _____
- a.** the euro appreciated relative to both the Canadian dollar and the yen.
 - b.** the euro appreciated relative to the Canadian dollar, but depreciated relative to the yen.
 - c.** the euro depreciated relative to both the Canadian dollar and the yen.
 - d.** the euro depreciated relative to the Canadian dollar, but appreciated relative to the yen.
- 16.** Over the course of a year, the nominal exchange rate rises by 2%, domestic inflation is 3% per year, and foreign inflation is 1% per year. What is the percentage change in the real exchange rate over the course of the year? Answer _____
- a.** 0%
 - b.** 2%
 - c.** 4%
 - d.** 6%
- 17.** In the very short run, before the J curve takes effect, a real depreciation will Answer _____
- a.** have no effect on net exports measured in terms of the home good.
 - b.** reduce net exports measured in terms of the home good.
 - c.** reduce exports and reduce net exports measured in terms of the home good.
 - d.** reduce exports and increase imports measured in terms of the foreign good.
- 18.** Since the beginning of the financial crisis in 2008, U.S. monetary base Answer _____
- a.** has shrunk by about 50%.
 - b.** has grown steadily by 1% to 3% per year.
 - c.** has been increasingly composed of currency rather than reserve deposits of banks.
 - d.** has roughly tripled in size.
- 19.** According to the Taylor Rule, a 2-percentage-point increase in the inflation rate would lead the Fed to Answer _____
- a.** reduce the real Federal Funds rate by 2 percentage points.
 - b.** reduce the rate of monetary growth by 2 percentage points.
 - c.** increase the nominal Federal Funds rate by 3 percentage points.
 - d.** conduct open-market purchases of bonds.

- 20.** The actual deficit is _____ than the full-employment deficit at business cycle troughs and _____ than the full-employment deficit at business cycle peaks. Answer _____
- a.** larger in magnitude; larger in magnitude
 - b.** larger in magnitude; smaller in magnitude
 - c.** smaller in magnitude; larger in magnitude
 - d.** smaller in magnitude; smaller in magnitude
- 21.** A procyclical variable Answer _____
- a.** promotes economic well-being by reducing the misery index.
 - b.** has high volatility over the course of a business cycle.
 - c.** increases during booms and decreases during recessions.
 - d.** makes monetary policy more independent of the treasury.
- 22.** The public, including overseas holders of U.S. Treasury securities, holds about _____ of U.S. Treasury securities; other agencies of the Federal government hold about _____ of U.S. Treasury securities. Answer _____
- a.** \$15 billion; \$10 billion
 - b.** \$5 trillion; \$20 trillion
 - c.** \$10 trillion; \$5 trillion
 - d.** \$15 trillion; \$10 trillion
- 23.** For a saver with a zero intertemporal elasticity of substitution, the introduction of IRAs, which increase the after-tax rate of return on saving, will Answer _____
- a.** either increase or decrease saving depending on whether the rate of time preference is small or large.
 - b.** unambiguously increase saving because the increase in the after-tax rate of return has a larger effect than the zero elasticity of substitution.
 - c.** have offsetting income and substitution effects so that saving is unchanged.
 - d.** unambiguously reduce saving because the substitution effect is zero and the income effect increases consumption.

- 24.** The introduction of a one-time tax increase of \$1000 per person (regardless of the amount worked) **next year** will Answer _____
- a.** have no effect on labor supply in the current year because there is no substitution effect.
 - b.** decrease the amount of labor employed in the current year but increase the real wage rate in the current year.
 - c.** decrease the amount of labor employed in the current year and reduce the real wage rate in the current year.
 - d.** increase the amount of labor employed in the current year and reduce the real wage rate in the current year.
- 25.** In recent years, the United States had _____ net factor payments from abroad and a _____ net international asset position. Answer _____
- a.** positive; positive
 - b.** positive; negative
 - c.** negative; negative
 - d.** negative; positive
- 26.** The current nominal yield on 10-year nominal Treasury bonds is 1.95% per year and the current real yield on 10-year TIPS is -0.33% per year. Therefore, Answer _____
- a.** only a foolish investor would hold TIPS.
 - b.** if investors no have aversion to risk or illiquidity, they expect inflation to average about 2.28% per year over the next 10 years.
 - c.** the expected real marginal product of capital is slightly negative.
 - d.** risk-neutral investors expect deflation over the next 10 years.

QUESTION II (68 points) Consider the following Keynesian open economy.

Consumption:	$C = 2740 + 0.6(Y - T) - 1000r$
Investment:	$I = 1500 - 3500r$
Government purchases:	$G = 3750$
Taxes:	$T = 2750$
Net exports:	$NX = -0.1Y - 500r + 0.1Y_{For} + 1000r_{For}$
Full-employment output:	$\bar{Y} = 15,000$
Nominal money supply:	$M = 48,000$
Real money demand:	$L = 140 + 0.1Y - 4000(r + \pi^e)$
Expected inflation rate:	$\pi^e = 0$
Foreign income:	$Y_{For} = 12,000$
Foreign real interest rate:	$r_{For} = 0.01$

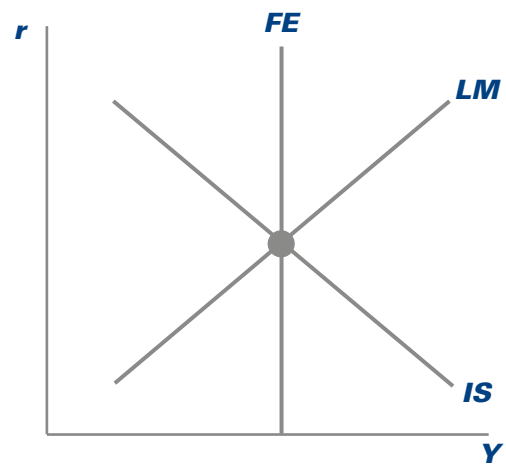
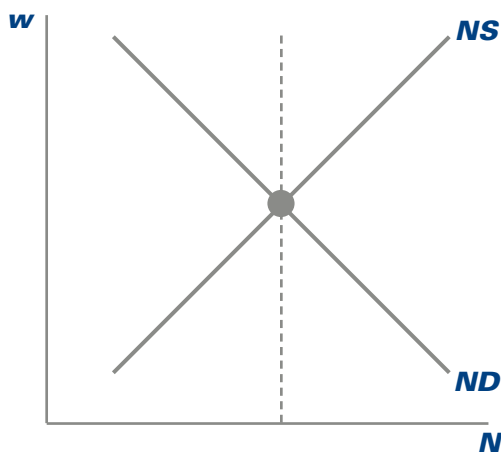
[Assume that $NFP = NUT = 0$.]

- A.** (5 points) What is the equation of the IS curve?
- B.** (26 points) Suppose that the price level is fixed at $P = 32$ in the short run.
- (5 points) What is the equation of the LM curve in the short run, while the price level remains fixed?
 - (21 points) What are the short-run equilibrium values of output, the real interest rate, consumption, investment, net exports, national saving, and velocity?
- C.** (16 points) What are the long-run equilibrium values of output, the real interest rate, consumption, investment, net exports, the price level, national saving, and velocity?
- D.** (21 points) Suppose that the government wants choose values for taxes (T), government purchases (G), and the nominal money supply (M) to reach a long-run equilibrium with (a) $NX = -300$; (b) a government budget deficit, $G - T$, equal to 630; and (c) a price level $P = 31$. This question will guide you through the analysis.
- (5 points) What value of the real interest rate will achieve $NX = -300$ in general equilibrium?
 - (4 points) What is the value of $C + G$ in long-run equilibrium with $NX = -300$?
 - (8 points) What values of G and T will lead to long-run equilibrium with $NX = -300$ and $G - T = 630$? [Hint: What value of $G = T + 630$ will achieve $C + G$ equal to the value in part D.2?]

4. (4 points) What value of the nominal money supply will achieve a long-run equilibrium with $P = 31$ when $NX = -300$ and $G - T = 630$?

QUESTION III. (44 points) Consider a classical closed economy that suffers a temporary adverse productivity shock. The government in this economy is committed to adjusting the level of government purchases to maintain employment unchanged. The central bank is committed to maintaining a constant price level.

- A. (12 points) Using the labor supply/labor demand graph below, (1) show the effect of the temporary adverse productivity shock. BE SURE TO IDENTIFY WHICH CURVE (OR CURVE) SHIFTS AND TO EXPLAIN THE SHIFT; (2) show the effect of the change in government purchases that will maintain employment unchanged. BE SURE TO STATE WHETHER GOVERNMENT PURCHASES INCREASE, DECREASE, OR REMAIN UNCHANGED, AND EXPLAIN WHY ANY CURVES SHIFT IN RESPONSE.



- B. (32 points) Use the IS/LM diagram shown above to illustrate the effects of the temporary adverse productivity shock, any change in government purchases to maintain constant employment, and any change in the nominal money supply to maintain a constant price level.
1. (8 points) In the IS/LM diagram above, illustrate any changes in the FE line resulting from the temporary adverse productivity shock and the changes in government purchases and the nominal money supply needed to maintain constant employment and a constant price level. BE SURE TO EXPLAIN ANY SHIFT OF THE FE LINE.
 2. (8 points) In the IS/LM diagram on the previous page, illustrate any changes in the IS curve resulting from the temporary adverse productivity shock and the changes in government purchases and the nominal money supply needed to maintain constant employment and a constant price level. BE SURE TO EXPLAIN ANY SHIFT OF THE IS CURVE.

3. (8 points) In the IS/LM diagram on the previous page, illustrate any change in the LM curve resulting from the temporary adverse productivity shock and the changes in government purchases and the nominal money supply needed to maintain constant employment and a constant price level. BE SURE TO EXPLAIN ANY SHIFT OF THE LM CURVE AND TO EXPLAIN WHY THE NOMINAL SUPPLY INCREASES, REMAINS CONSTANT, OR DECREASES.
4. (8 points) If aggregate economic activity is measured by output, is the nominal money supply procyclical, countercyclical, or acyclical? EXPLAIN.

QUESTION IV (48 points) The left-side of the table contains data for 12 variables in a closed economy. Fill in the values of the 12 variables on the right-side of the table, being sure to give both the numerical value (in the column headed “number”) and the units (in the column headed “units”). If there are no units, indicate “none”. The tax function in this economy is $T = t \times Y$, where T is taxes, t is the tax rate on output, and Y is GDP . Assume that Okun’s Law holds. Also assume that the price level is $P = 1$, so that you don’t need to worry about the distinction between real and nominal flows. BE SURE TO SHOW YOUR WORK. [YOU CAN USE THE SPACE AT THE BOTTOM OF THIS PAGE AND THE NEXT PAGE TO SHOW WORK.]

	NUMBER	UNITS		NUMBER	UNITS
Velocity	1.8	Per year	Reserves		
Deposits	6500	Billions of dollars	Money supply		
Currency	1500	Billions of dollars	Money multiplier		
Monetary base	4000	Billions of dollars	GDP		
Average product of labor	80	Thousands of dollars per year per worker	Employment (number of people)		
Natural rate of unemployment	0.08	(none)	Unemployment (number of people)		
Labor force	200	Millions of people	Unemployment rate		
Tax rate, t	0.2	(none)	Full-employment GDP		
Interest payments by government	300	Billions of dollars per year	Taxes		
Transfer payments	1200	Billions of dollars per year	Government purchases		
Primary deficit	1000	Billions of dollars per year	Deficit		
Investment	2500	Billions of dollars per year	Full-employment deficit		

Macroeconomics and the Global Economic Environment (FNCE613)

SAMPLE EXAM 2

NAME

(IN BLOCK LETTERS)

READ THE FOLLOWING DIRECTIONS CAREFULLY.

PLEASE DO NOT TURN THE PAGE UNTIL THE EXAM BEGINS.

1. PRINT your name LEGIBLY IN BLOCK LETTERS at the top of THIS PAGE
2. You will have **90 minutes** to complete this examination. When time is called at the end of the examination, you must **STOP WRITING IMMEDIATELY**.
3. Only short answers are required
4. You can use one double sided sheet of letter-size paper with formulas
5. You may use a calculator, but you may **NOT** use a computer.

QUESTION I (24 points)

Argentina pegged its currency against the US dollar since about 1991 until December of 2001. During this period major competitors like Mexico and Brazil devalued their currency substantially.

- A.** What are the consequences of these devaluations by Brazil and Mexico to Argentina's international competitiveness and to its trade deficit?
- B.** Illustrate the effect of these devaluations on the IS/LM model. What is the impact on short term GDP and employment in Argentina?

Argentina fell into a recession in 1999 that produced a drop of almost 10% in GDP between late 1998 and the end of 2001. It became increasingly clear that the only alternative to a currency devaluation was a sharp drop in prices and wages.

- C.** Why would a drop in wages and prices have similar effects to that of a currency devaluation?

Unfortunately given public resistance to significant cuts in wages and public spending foreign investors became increasingly nervous and begun to speculate against the currency.

- D.** What is the effect of this speculation on Argentina's foreign exchange market and on its short-term interest rates?
- E.** What is the effect of this lack of confidence by international investors on GDP and employment in Argentina? Show these effects in the IS/LM model.

Suppose Argentina prohibits capital outflows. Formally the central bank suspends the convertibility of its currency into dollars.

- F.** What is the effect of this policy on their reserve losses and money supply?

QUESTION II (18 points)

Suppose a closed economy was operating close to full employment and experiences a sudden collapse in housing prices.

- A.** Show the corresponding **short run** effects on the IS/LM diagram. What are the short run effects of this sudden drop on:
- a.** GDP
 - b.** Employment
 - c.** Output gap
 - d.** Real interest rates
 - e.** Prices
- B.** Show the **long run** effects of persistently low consumer confidence on the same diagram. How does the new **long run** equilibrium compare with the one before the shock in terms of:
- a.** GDP
 - b.** Employment
 - c.** Output gap
 - d.** Real interest rates
 - e.** Prices
- C.** What should the Central Bank do to speed up an economic recovery? Starting from the short run equilibrium in part A show the effects of your policy recommendation on the IS/LM diagram. What would be the effects of this policy on:
- a.** Consumption
 - b.** Investment
 - c.** Interest rates
 - d.** Unemployment rate
 - e.** Potential output

QUESTION III (24 points)

Consider an economy characterized by the following equations

$$C = 50 + 0.8(Y - T) - 150r$$

$$I = 100 - 250r$$

$$G = 50$$

$$T = 50$$

$$L = Y - 500r$$

$$M / P = 500$$

Full employment output is 600.

- A.** What is the equation for the IS curve?
- B.** What is the equation of the LM curve?
- C.** What is the equation for the FE line?
- D.** What is the short run equilibrium level of national income and real interest rates for this economy?
- E.** What is the long run value of real interest rates?
- F.** In the long run investment will ____ and consumption will ____ relative to the short-run equilibrium.
- G.** Converging to the long run equilibrium requires that either prices will ____ or that nominal money supply will ____.
- H.** Converging to the long run equilibrium requires that employment will ____ and that the budget deficit will ____.

QUESTION IV (10 points)

Consider an economy where the only source of business cycle fluctuations is the foreign sector. No shocks originate in this economy, but shocks in the rest of the world sometimes increase this country's net exports and sometimes decrease this country's net exports.

- A.** Use an IS-LM diagram to illustrate the short-run effect of an increase in income in the rest of the world that increases this country's net exports. What are the short-run effects on this country's output and real interest rate?
- B.** Briefly explain whether each of the following variables is procyclical (increases during expansions) or countercyclical (increases in recessions).

Employment:

Real interest rate:

Investment:

Saving:

Trade surplus:

QUESTION V (12 points)

Consider the following data regarding the monetary statistics of an economy. The currency-deposit ratio (cu) is 0.6 and the reserve-deposit ratio (res) is 0.2. The monetary base in this country is 400 dollars.

- A.** What is the value of the money multiplier in this economy?
- B.** What is the value of the money supply in this economy?
- C.** What are the values of currency and deposits in this economy?

QUESTION VI (12 points)

Over the last decade several countries in Europe have begun to reform their labor markets to increase the labor force participation and employment. For the purposes of this question consider only two specific measures: increasing retirement age and reducing unemployment benefits.

- A.** Show graphically the effect of an increase in labor force participation on the labor market equilibrium?
- B.** Show graphically the effect of these policies on the IS/LM/FE diagram
- C.** What are the long run effects of these policies on Europe's GDP and its international competitiveness?
- D.** What are the long run effects of these policies on the government budget deficits?

Sample Exam 1 Answers FNCE613

QUESTION I

- | | |
|-------|-------|
| 1. d | 14. b |
| 2. b | 15. c |
| 3. c | 16. c |
| 4. c | 17. b |
| 5. d | 18. d |
| 6. d | 19. c |
| 7. a | 20. b |
| 8. c | 21. c |
| 9. c | 22. c |
| 10. a | 23. d |
| 11. d | 24. d |
| 12. a | 25. b |
| 13. d | 26. b |

QUESTION II

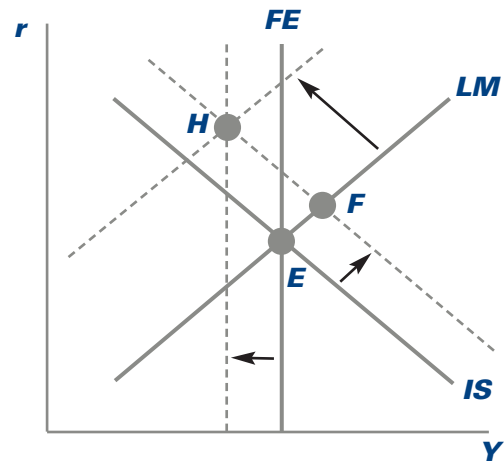
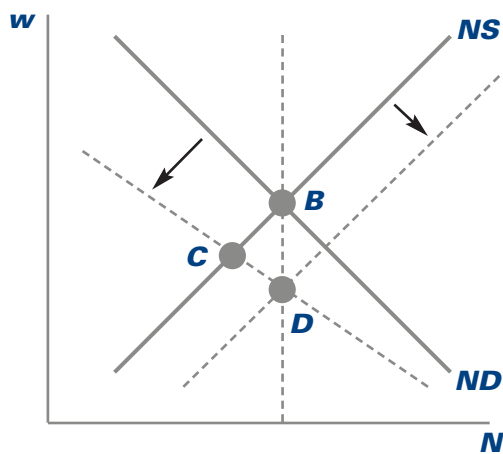
- A.** $Y = C + I + G + NX = [2740 + 0.6(Y - T) - 1000r] + [1500 - 3500r] + 3750 + [-0.1Y - 500r + 0.1Y_{For} + 1000r_{For}] = [2740 + 0.6(Y - 2750) - 1000r] + [1500 - 3500r] + 3750 + [-0.1Y - 500r + 0.1(12,000) + 1000(0.01)]$, so $0.5Y = 7550 - 5000r$. Therefore, $Y = 15,100 - 10,000r$ or, equivalently, $r = 1.51 - 0.0001Y$.
- B. 1.** $(48,000)/(32) = M/P = L = 140 + 0.1Y - 4000(r + \pi^e) = 140 + 0.1Y - 4000r$. Therefore, $1500 = 140 + 0.1Y - 4000r$, which implies $1360 = 0.1Y - 4000r$. Therefore, $Y = 13,600 + 40,000r$ or, equivalently, $r = 0.000025Y - 0.34$.

- B. 2.** IS/LM intersection: $15,100 - 10,000r = Y = 13,600 + 40,000r$, which implies $1500 = 50,000r$, so $r = 0.03$. Substitute $r = 0.03$ into IS curve: $Y = 15,100 - 10,000r = 15,100 - (10,000)(0.03)$, so $Y = 14,800$. [check: substitute $r = 0.03$ into LM curve: $Y = 13,600 + 40,000r = 13,600 + (40,000)(0.03) = 14,800$.] Consumption = $C = 2740 + 0.6(Y - T) - 1000r = 2740 + 0.6(14,800 - 2750) - (1000)(0.03)$, so $C = 9940$. Investment = $I = 1500 - 3500r = 1500 - (3500)(0.03)$, so $I = 1395$. Net Exports = $NX = -0.1Y - 500r + 0.1Y_{For} + 1000r_{For} = -0.1(14,800) - 500(0.03) + 0.1(12,000) + 1000(0.01)$, so $NX = -285$. [check: $14,800 = Y = C + I + G + NX = 9940 + 1395 + 3750 - 285 = 14,800$.] National Saving = $S = Y - C - G = 14,800 - 9940 - 3750$, so **national saving = 1110**.
[check: with $NFP = NUT = 0$, $-285 = NX = CA = S - I = 1110 - 1395 = -285$.]
Velocity = $V = (P)(Y)/M = (32)(14,800)/(48,000)$, so **velocity = 9.866667**.
- C.** In long-run equilibrium, $Y = \bar{Y}$, so $Y = 15,000$. Substitute $Y = 15,000$ into the IS curve to obtain $r = 1.51 - (0.0001)(15,000)$, so $r = 0.01$. Consumption = $C = 2740 + 0.6(Y - T) - 1000r = 2740 + 0.6(15,000 - 2750) - (1000)(0.01)$, so $C = 10,080$. Investment = $I = 1500 - 3500r = 1500 - (3500)(0.01)$, so $I = 1465$. Net Exports = $NX = -0.1Y - 500r + 0.1Y_{For} + 1000r_{For} = -(0.1)(15,000) - (500)(0.01) + (0.1)(12,000) + (1000)(0.01)$, so $NX = -295$. [check: $15,000 = Y = C + I + G + NX = 10,080 + 1465 + 3750 - 295 = 15,000$.] $P = M/L = (48,000)/(140 + 0.1Y - 4000(r + \pi^e)) = (48,000)/(140 + (0.1)(15,000) - (4000)(0.01 + 0)) = 48,000/1600$, so $P = 30$. National saving = $S = Y - C - G = 15,000 - 10,080 - 3750$, so **national saving = 1170**. [check: with $NFP = NUT = 0$, $-295 = NX = CA = S - I = 1170 - 1465 = -295$.] Velocity = $V = (P)(Y)/M = (30)(15,000)/(48,000)$, so **velocity = 9.375**.
- D. 1.** In general equilibrium, $Y = \bar{Y} = 15,000$. Find the value of r for which $-300 = NX = -0.1Y - 500r + 0.1Y_{For} + 1000r_{For} = -0.1(15,000) - 500r + 0.1(12,000) + 1000(0.01) = -290 - 500r$, which implies $500r = 10$. Therefore, $r = 0.02$ will achieve $NX = -300$ in long-run equilibrium.
- 2.** In long-run equilibrium with $NX = -300$, $r = 0.02$ (from part D.1), so $I = 1500 - 3500r = 1500 - 3500(0.02) = 1430$. Hence, in long-run equilibrium with $NX = -300$, $Y = \bar{Y} = 15,000$, and $I = 1430$, so $15,000 = Y = C + I + G + NX = C + 1430 + G - 300$. Therefore, $C + G = 13,870$ in long-run equilibrium with $NX = -300$.
- 3.** Set $Y = \bar{Y} = 15,000$, $r = 0.02$, and $G = T + 630$ in $13,870 = C + G = (2740 + 0.6(Y - T) - 1000r) + G = (2740 + 0.6(15,000 - T) - 1000(0.02)) + T + 630$ to obtain $13,870 = 2740 + 9000 - 0.6T - 20 + T + 630 = 12,350 + 0.4T$. Therefore, $1520 = 0.4T$, so $T = 3800$, and $G = T + 630$ so $G = 4430$. [check: $C = 2740 + 0.6(15,000 - 3800) - 1000(0.02)$, so $C = 9440$. As shown in part D.2, $I = 1430$. Therefore, $NX = Y - (C + I + G) = 15,000 - (9440 + 1430 + 4430) = 15,000 - 15,300 = -300$.]
- 4.** $M = (P)(L) = (31)(140 + 0.1Y - 4000(r + \pi^e)) = (31)(140 + 0.1(15,000) - 4000(0.02 + 0)) = (31)(1560)$, so $M = 48,360$ will achieve a short-run equilibrium with $P = 31$, $G - T = 630$, and $NX = -300$.

QUESTION III.

- A.** (1) The temporary adverse productivity shock reduces the MPN at every level of employment. Since the labor demand is the MPN curve, the **labor demand curve shifts downward**. The labor supply curve does not change in response to the temporary productivity shock. In the absence of a change in government purchases, the equilibrium moves to point C from point B.

(2) An **increase in government purchases** will make workers poorer (because of an increase in current or future taxes) and hence workers can afford less leisure and will supply more labor, shifting the labor supply to the right, until it passes through point D, with the same level of employment as in the original equilibrium at point B.



- B.** 1. The FE line is a vertical line at $Y = \bar{Y} = A \times F(K, \bar{N})$. The temporary adverse productivity shock is a reduction in A . In the absence of a change in G , equilibrium in the labor market would move to point C, with a decline in employment. However, government purchases are increased to maintain $\bar{N}$ unchanged. So, with $\bar{N}$ unchanged, the fall in A implies that $\bar{Y}$ falls and hence the FE line shifts to the left.
2. The increase in government purchases causes the IS curve to shift upward and to the right (an increase in government purchases causes an excess demand for goods at the initial values of Y and r , and this excess demand for goods can be eliminated by an increase in Y and/or an increase in r , so the IS curve shifts upward). Neither the temporary productivity shock nor any change in the nominal money supply directly shifts the IS curve.
3. The upward shift of the IS curve moves the IS/LM intersection to point F, which is to the right of the new FE line. Therefore, output at the new IS/LM intersection is higher than the new full-employment level of output, which puts upward on prices. If the nominal money supply were to remain unchanged, the price level would increase, reducing the real money supply M/P , and shifting the LM curve upward until it passes through the FE/IS intersection at point H. To prevent the price level from rising, **the central bank can reduce the nominal money supply**, which reduces the real money for a given price level, thereby shifting the LM curve upward until it passes through point H.

4. In response to a temporary adverse productivity shock, the economy moves from point E to point H in the IS/LM diagram, so output falls, which means that aggregate economic activity falls, i.e. the economy goes into a recession. As explained in part B.3, the nominal money supply falls in order to keep the price level from rising. Since the nominal money supply falls during recessions, **the nominal money supply is procyclical.**

QUESTION IV

	NUMBER	UNITS		NUMBER	UNITS
Velocity	1.8	Per year	Reserves	2500	Billions of dollars
Deposits	6500	Billions of dollars	Money supply	8000	Billions of dollars
Currency	1500	Billions of dollars	Money multiplier	2	None
Monetary base	4000	Billions of dollars	GDP	14,400	Billions of dollars per year
Average product of labor	80	Thousands of dollars per year per worker	Employment (number of people)	180	Millions of people
Natural rate of unemployment	0.08	(none)	Unemployment (number of people)	20	Millions of people
Labor force	200	Millions of people	Unemployment rate	0.10	None
Tax rate, t	0.2	(none)	Full-employment GDP	15,000	Billions of dollars per year
Interest payments by government	300	Billions of dollars per year	Taxes	2880	Billions of dollars per year
Transfer payments	1200	Billions of dollars per year	Government purchases	2680	Billions of dollars per year
Primary deficit	1000	Billions of dollars per year	Deficit	1300	Billions of dollars per year
Investment	2500	Billions of dollars per year	Full-employment deficit	1180	Billions of dollars per year

Monetary base = currency plus reserves, so reserves = monetary base – currency = 4000 billions of dollars – 1500 billions of dollars. Therefore, **reserves = 2500 billions of dollars.**

Money supply = M = currency + deposits = 1500 billions of dollars + 6500 billions of dollars, so **$M = 8000$ billions of dollars.**

Money multiplier = (money supply)/(monetary base) = (8000 billions of dollars)/(4000 billions of dollars), so **money multiplier = 2.**

Velocity = GDP/M , so $GDP = (\text{velocity})(M) = (1.8 \text{ per year})(8000 \text{ billions of dollars})$. Therefore, **$GDP = 14,400$ billions of dollars per year.**

APL = average product of labor = GDP/E, where E is number of people employed, so $E = \text{GDP/APL} = (14,400 \text{ billions of dollars per year}) / (80 \text{ thousands of dollars per year per worker})$. Therefore, **employment = 180 millions of workers.**

$U = \text{LF} - E = 200 \text{ millions of people} - 180 \text{ millions of people}$, so **unemployment = 20 millions of people.**

Unemployment rate = $u = U/\text{LF} = (20 \text{ millions of people}) / (200 \text{ millions of people}) = 0.10$.

Okun's Law: $(\bar{Y} - Y)/\bar{Y} = 2(u - \bar{u})$, so $1 - \frac{Y}{\bar{Y}} = 2(u - \bar{u})$, which implies

$$\bar{Y} = \frac{Y}{1 - 2(u - \bar{u})} = \frac{14,400 \text{ billions of dollars per year}}{1 - 2(0.10 - 0.08)}.$$

Therefore,

$\bar{Y} = 15,000 \text{ billions of dollars per year.}$

Taxes = $t \times Y = (0.2)(14,400 \text{ billions of dollars per year})$ so **Taxes = 2880 billions of dollars per year.**

Primary deficit = $G + \text{TR} - T$, so $G = \text{primary deficit} - \text{TR} + T = 1000 \text{ billions of dollars per year} - 1200 \text{ billions of dollars per year} + 2880 \text{ billions of dollars per year}$. Therefore, **G = 2680 billions of dollars per year.**

Deficit = primary deficit + interest payments by government = $1000 \text{ billions of dollars per year} + 300 \text{ billions of dollars per year}$. Therefore, **deficit = 1300 billions of dollars per year.**

Full-employment deficit = $G + \text{TR} + \text{INT} - t \times (\text{Full-employment GDP}) = 2680 \text{ billions of dollars per year} + 1200 \text{ billions of dollars per year} + 300 \text{ billions of dollars per year} - (0.2)(15,000 \text{ billions of dollars per year})$, so **full-employment deficit = 1180 billions of dollars per year.**

Sample Exam 2 Answers FNCE613

QUESTION I

- A.** Argentina's exports become less competitive as the real exchange rate appreciates. This increases the country's trade deficit.
- B.** The IS curve shifts down and to the left. This reduces output and employment.
- C.** Essentially because it would make Argentina more competitive and boost its net exports. In either case the IS curve would shift up.
- D.** The speculation lowers the reserves of the central bank and the money supply. This will push up short term interest rates.
- E.** The contraction in the money supply will shift the LM curve up and pushes up short term interest rates. The speculation makes the recession worst by further reducing employment and GDP.
- F.** This reduces or eliminates sales of the domestic currency and eliminates the loss of reserves by the central bank. The money supply stops falling and the LM curve no longer shifts up.

QUESTION II (18 points)

- A.**
 - a.** GDP Falls
 - b.** Employment Falls
 - c.** Output gap Rises
 - d.** Real interest rates Fall
 - e.** Prices No Change
- B.**
 - a.** GDP Same
 - b.** Employment Same
 - c.** Output gap Same
 - d.** Real interest rates Lower
 - e.** Prices Lower
- C.**
 - a.** Consumption Rises
 - b.** Investment Rises
 - c.** Interest rates Fall
 - d.** Unemployment rate Falls
 - e.** Potential output None

QUESTION III

- A.** $C+I+G=Y$
 $0.2Y = 160 - 400r$
- B.** $M/P = L$
 $500 = Y - 500r$
- C.** $Y = 600$
- D.** In the short run we look at the intersection of the IS and LM curves only.
 $Y = 560, r = 12\%$
- E.** We know output is at $FE = 600$.
 In the long run the LM curve shifts as necessary to meet the IS curve where this curve crosses FE.
 So we just compute the interest rate by plugging $Y=600$ in the IS curve.
 $r = 10\%$
- F.** Rise; Rise
 Since interest rates fall this will increase consumption and investment.
- G.** Fall; Rise
 The LM curve must shift down, which implies real money supply (M/P) will rise.
- H.** Rise; Fall
 Output increases so employment must also increase. This will also raise tax revenues and lower any budget deficit.

QUESTION IV

- A.** The increase in this country's net exports causes the IS curve to shift up and to the right in this country. In the short run, output and the real interest rate both increase.
- B.** Employment: procyclical
 Real interest rate: procyclical
 Investment: countercyclical
 Saving: procyclical
 Trade surplus: procyclical

The IS-LM diagram shows that output (Y) and the real interest rate (r) both increase so the real interest rate is procyclical.

In order for output to increase, firms must use more labor so employment increases, and thus is procyclical. The increase in r implies that investment falls and thus is countercyclical.

Since interest rates and income go up in expansions so does private (and national) saving.

The increase in net exports was the original source of our expansion, so the trade surplus is procyclical.

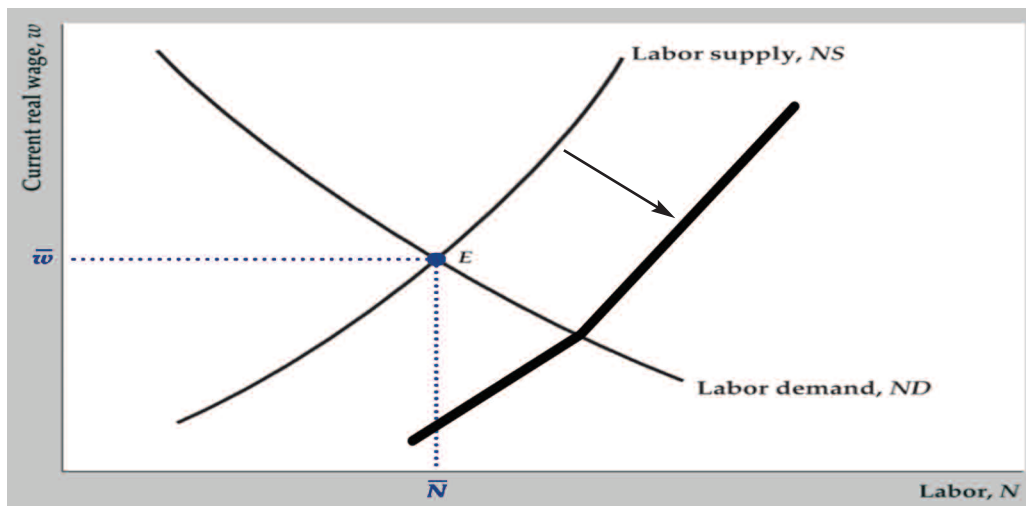
QUESTION V

- A.** $mm = (1+cu)/(res+cu) = (1+0.6)/(0.2+0.6) = 1.6/0.8 = 2.$
- B.** $M = (mm)Base = 2(400 \text{ dollars}) = 800 \text{ dollars}.$
- C.** $M = CU + DEP.$ Dividing both sides of this equation by DEP yields $M/DEP = cu + 1$ which implies $DEP = M/(cu+1) = (800 \text{ dollars})/(0.6+1).$ Therefore, $DEP = 500$ dollars. $CU = (cu)(DEP) = 0.6(500 \text{ dollars}) = 300 \text{ dollars}.$
[check: $CU + DEP = 300 \text{ dollars} + 500 \text{ dollars} = 800 \text{ dollars} = M.$]

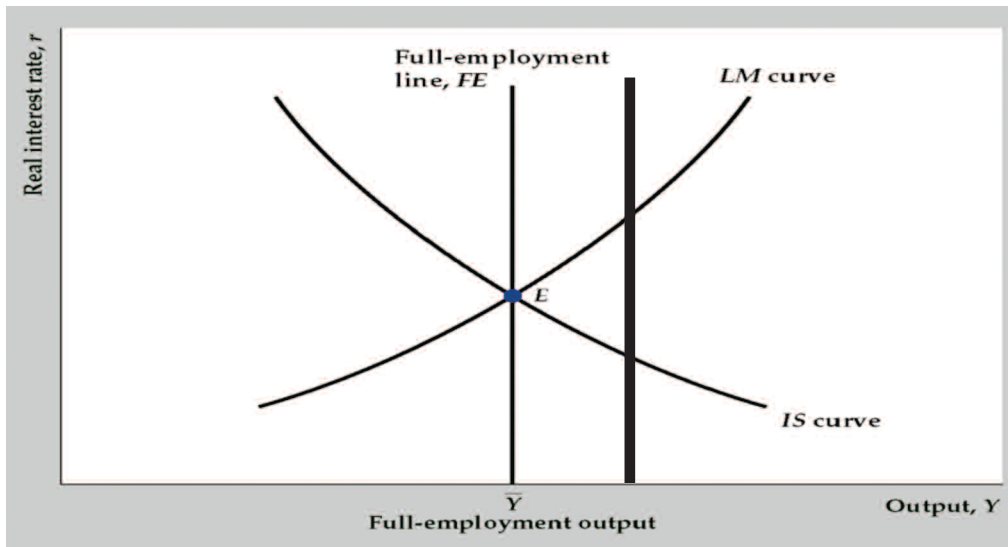
QUESTION VI

Over the last decade several countries in Europe have begun to reform their labor markets to increase the labor force participation and employment. For the purposes of this question consider only two specific measures: increasing retirement age and reducing unemployment benefits.

- A.** The labor supply curve shifts down and to the right. This increases the equilibrium level of employment – the “full employment.”



- B.** An increase in full employment increases potential GDP. The FE line shifts to the right.



Note: To reach the new long run equilibrium prices will have to fall.

- C.** A reduction in wages and prices will make exports cheaper and improve competitiveness. Long run GDP will be higher as we have seen above.
- D.** Government spending on these programs will fall.
In the long run tax revenues will also increase since national income increases.
Together they imply a lower budget deficit.

Economics of Managerial Decision Making (MGEC611)

SAMPLE EXAM (120 minutes in length)

1. Managing your consulting firm

You own a small IT consulting firm with a product that helps firms manage their personnel costs. The demand for your product is:

$$Q = 500 - .001 \times P$$

Where Q is the number of annual service contracts you sell and P is the annual service fee your charge. Thus if $P = \$100,000$, then you will sell 400 annual service contracts.

Each contract requires a team of two employees to service the contract, one on-site with the client and the other in the home office. Each employee is paid \$100,000 per year. Your firm also has an annual fixed cost charge of \$10,000,000 (overhead, development, rental of office space, leasing of hardware, etc.). These facts fully describe your firm's cost structure.

To maximize the firm's annual profits (net cash flow) you should charge a price of _____ per contract and at that price you can expect to have _____ service contracts per year. You will hire _____ employees to manage those contracts. Your firm's annual profits (net cash flow) will be _____ per year.

2. Do we move to Greenwich?

New York City is in the midst of a fiscal crisis and their solution has been to raise the sales tax on luxury items. The tax is \$250 per item and the tax is levied on the luxury store; that is, the store pays the tax. You run Tiffany's. Here are the key facts:

Annual demand for luxury items from Tiffany's NYC store:

$$Q = 10,000 - P$$

Where Q is the number of luxury items sold in the year and P is the price Tiffany's charges for the items.

Cost of retailing luxury items in the NYC store:

$$\text{Total Cost} = C = 500 \times Q$$

You are upset about the tax since that seems like an increase in costs. Your marketing people tell you that there is an opportunity to relocate the NYC store in Greenwich, CT. If you relocate, your demand and costs in Greenwich will be the same as in NYC, but you can avoid the NYC sales tax.

Unfortunately, Greenwich has its own tax: A Business Privilege Tax which requires each luxury store such as Tiffany's to pay \$500,000/year. This is a fixed tax; that is, you pay no matter what your sales. Worldwide Tiffany headquarters will allow you to relocate only one store in the NY-CT metropolitan area. Do you leave NYC and relocate in Greenwich?

I (will/will not; circle one) relocate my store in Greenwich because:

3. Being a market-maker

In medieval times, face-to-face bargaining and barter trade was the common form of exchange — “I’ll give you a pair of shoes for a bushel of your corn”. But with the development of currencies, barter was replaced by trade — “I’ll give you a pair of shoes for two gold coins,” but bargaining was still very common. Unfortunately, sometimes the person who wanted to sell shoes was offered too low a price and sometimes a person who wanted shoes was asked to pay too much. This discouraged trade and often no, or very limited, trade occurred. BUT THEN CAME THE INVENTION OF MARKET EXCHANGES. The person who ran the exchange matched buyers with sellers at a common market price, trades were concluded, and everyone benefited, including the market-maker.

You arrive at a medieval commerce center and announce that you will set up a market exchange for wheat, but at a price. You will tell the farmers’ cooperative that they need to give you their supply curve for offering wheat — that is, what price they must be paid to offer their wheat — and you tell the bakers’ guild that they will need to give you their demand curve for wheat — that is, what they will pay for a wheat. The head of the Cooperative and Guild canvass their members, everyone reveals their true costs and benefits, and here is what you find.

Farmers’ Cooperative Supply Curve to Offer Wheat:

$$Q_s = 10 \times P_s - 400; \text{ where } Q_s = 0 \text{ if } P_s \text{ is } 40 \text{ (guilder) or lower}$$

Bakers’ Demand Curve to Purchase Wheat:

$$Q_d = 1000 - 10 \times P_d$$

Q_s is the cartloads of wheat supplied if offered the supply price of P_s guilders per cartload and Q_d is the cartloads of wheat purchased if offered the demand price of P_d guilders per cartload. With this information, you realize you can indeed run a successful market. As a market-maker, it is your job to announce a common market price ($P_s = P = P_d$) at which all transactions between farmers and bakers might take place.

In your best-run market, you announce a market price of _____ guilders per cartload and _____ cartloads of wheat are exchanged at that price. You then charge the Farmers’ Cooperative a lump-sum (fixed) fee of _____ for your services and the Bakers’ Guild a lump-sum (fixed) fee of _____ for your services. In the end — after trade and paying your fee — everyone (including you) agree that market-making is a valuable service.

4. Cold winters and OJ business

You grow oranges and you can concentrate orange juice. The concentrated orange juice market is a national market and competitive. The national market price is \$3/can of OJ concentrate. You are a small producer and cannot influence this national price and this is what you are paid when you can sell a can of concentrate. You currently use a plant which has the capacity to produce 1 million cans a year. There is no thought of expanding capacity, but you want to make as much as you can each year with the existing plant. The average cost of making one can of concentrate in your plant is:

$$\text{Your Average Cost per Can in Dollars} = AC = 1 + 5 \times (c_0)$$

Where c_0 is the cost of one orange and each can needs five oranges — that is, if it costs \$.10 (10 cents) to grow an orange or to buy one in the orange market, then $AC = \$1.50$.

You also have your own orange groves and can grow all the oranges you need (5 million) to use your plant to full capacity. Of course, you always have the option to buy or sell your oranges in the national orange market. In a typical growing year, if you grow your own oranges it costs you \$.08/orange (8 cents per orange). If you buy or sell in the national orange market you will do so at the market price. Here is what you know about the national orange market:

$$\text{Market Demand for Oranges: } P_d = \$1 - .05 \times Q$$

$$\text{Typical Winter Market Supply of Oranges: } P_s = .05 + .0028 \times Q$$

where Q is the total amount of oranges sold (in units of 100 million, so if $Q = 1$, then 100 million oranges are sold), P_d is the price demanders of oranges will pay and P_s is the price that suppliers must receive in a typical growing year. *Unfortunately, this is not a typical growing year.* The weather service announces (with certainty) a cold growing season, and this will raise everyone's costs of growing oranges. Your costs will rise from \$.08/orange to \$.13/orange while the prices national suppliers must receive to cover their costs rises by the same \$.05/orange to:

$$\text{Cold Winter Supply of Oranges: } P_s = .10 + .0028 \times Q$$

What happens to your profits in this cold season compared to what they might have been had it been a “typical” growing year?

Because of the cold growing season my profits from growing oranges and canning concentrate will (rise, remain the same, fall; circle one) by _____ because:

5. The case of the engineer who knew a little economics

You have been hired to take over the management of your firm's main production plant. Currently the firm is very labor intensive – that's the way things have always been done. The plant uses 1600 workers ($L = 1600$) and 9 processing and polishing machines ($K = 9$). The cost per unit of output with this style of production is \$1400 per unit. From your experience in the industry, you know the production technology for making your firm's product is:

Production Function

$$Q = L^{.5}K^{.5}$$

Where Q is plant output per day, L is workers per day, and K is machines in use per day. Thus if, $L = 1600$ and $K = 9$, the plant can produce $Q = 120$ units of output per day: $120 = (1600)^{.5}(9)^{.5} = 40 \times 3$. *You also know that the current labor contract allows you to adjust the number of employees at the plant, but you must pay each employee \$100/day. A processing-polishing machine can be leased at a cost of \$900/day.¹*

To improve plant performance how would you adjust the production process? *Whatever you decide, the plant must meet its daily production target of 120 units of output per day.*

To meet the firm production target of 120 units per day, I would recommend we hire _____ workers per day and lease _____ machines per day. This will lower our costs per unit of output to _____ per unit.

6. Universities are businesses too!

U.S. states are being hit by the current recession so they are looking to save expenditures and to squeeze additional revenues from all possible sources. States now subsidize higher education. You have been hired by the governor and the president of the state university to “rationalize” the pricing policy for the state university. The price in this case is the tuition charged for a year of coursework at the university. Here are the facts.

First, the admissions office (marketing department!) of the university tells you that the number of qualified applicants (Q) who apply and are admitted does depend on annual tuition (T), according to the following relationship:

$$Q = 50,000 - 2 \times T$$

where T is measured in dollars and Q is the number of qualified students who will apply and attend the university. For example, if $T = \$8,000$ (the current tuition), then enrollment at the university will be 34,000 students.

¹ Notice that with 1600 workers at \$100/day your current labor costs are \$160,000 per day and with 9 machines at \$900 per day your capital costs are \$8,100 per day. Thus your total costs are \$168,100. The plant makes 120 units and thus the average cost is \$1400.83 per unit.

Second, the Provost tells you that it currently costs a constant \$5,000/student to educate one student for one year. The Provost also tells you that the University has an annual charge against fixed costs (interest payments) of \$152 million dollars per year, which the state now covers through a state budget contribution for higher education. The Provost has been told by the governor that in these tight times, the state can no longer make this contribution. The University is on its own financially.

What do you recommend, if your objective is to maximize the net financial position of the University? Businesses might call the “net financial position” annual profits or net cash flow, but as University types, we cannot be so unrefined. We prefer “net financial position.”

To maximize the net financial position of the university I recommend that university set a course tuition of _____ per student. (*Fortunately, unfortunately*; circle one) this tuition (*is, is not*; circle one) sufficient to cover the university’s annual charges against fixed cost, and therefore the President will need to (*hide from, still beg from*; circle one) the governor a total net revenue of _____.

7. Who gets the new sports franchise?

In the United States, sports franchises — football, basketball, baseball — are allocated to city locations. The current owners sell new locations of teams to new owners. So if you want a team in your city, you pay a one-time “entry-fee” to the league owners (who divide up the proceeds) for the right to join the league. Suppose L.A. is competing against Oklahoma City for a new team. As President of the National Football League (NFL) you are working on behalf of the current owners; you need to recommend one of the two cities. L.A. is a “big” market and Oklahoma City is a “small” market. Football teams earn revenues from selling seats to the games and from TV rights to broadcast the game in the local area. The costs to the team are the variable costs associated with having fans come to games and the fixed costs of paying the annual interest costs of having a football stadium. There is only one team in each city. *Each team plays 10 home games each year. The demand to attend each home game is the same. You can assume all the information below is common knowledge.*

LOS ANGELES

Demand for Tickets to Each Game: $Q = 600,000 - 20,000 \times P$

Q = Tickets sold and fans attending each game; P = the ticket price per game.

Variable Costs per Fan in Attendance = $20 \times Q$

Fixed Cost per Year = \$10 million

Annual Revenue from TV Rights = \$20 million

OKLAHOMA CITY

Demand for Tickets to each Game: $Q = 100,000 - 1,000 \times P$
 Q = Tickets sold and fans attending each game; P = the ticket price per game.

Variable Costs per Fan in Attendance = $10 \times Q$
 Fixed Cost per Year = \$5 million (smaller stadium than LA)

Annual Revenue from TV Rights = \$10 million (smaller TV market than LA)

In computing what the maximum owner might each pay for the rights to have a team in their city, you can assume the annual interest rate for alternative investment is .10 and that each team exists into perpetuity. That is, if the team makes \$1 a year, then it has the same value as an alternative asset costing \$10 and producing \$1 a year in profits. In this case the team is worth $\$10 = \$1/.10$.

(Los Angeles, Oklahoma City; circle one) will be awarded the new franchise and the owners in the winning city will pay no less than _____ and no more than _____ to the current league owners. In the end, I think _____ will be paid to the league owners because:

Sample Exam Answers MGEC611

1. The trick here is getting your total costs and total revenue correctly specified, and then your task is to calculate profit maximization as $MR = MC$. The costs specification is:

$$\begin{aligned} TC &= 10,000,000 + (2 \text{ employees/contract})(\$100,000)Q \\ TC &= 10,000,000 + 200,000Q \\ MC &= 200,000 \end{aligned}$$

The total revenue specification is given once we correctly specified demand as $P = 500,000 - 1000Q$

$$\begin{aligned} TR = PQ &= (500,000 - 1000Q)Q = 500,000Q - 1000Q^2 \\ MR &= 500,000 - 2000Q \end{aligned}$$

Thus:

$$\begin{aligned} MR &= 500,000 - 2,000Q = 200,000 = MC \\ Q^* &= 150 \text{ contracts and from demand } P^* = \$350,000. \end{aligned}$$

Since you are servicing 150 contracts, you will need $L = 300$ employees. Given the values of Q^* and P^* you will find that firm profits are:

$$\Pi = TR - TC = (500,000 - 1000 \times 150) 150 - 10,000,000 - 200,000 \times 150 = \$12,500,000$$

To maximize the firm's annual profits (net cash flow), you should charge a price of **\$350,000** per contract and at that price you can expect to have **150** service contracts per year. You will hire **300** employees to manage those contracts. Your firm's annual profits (net cash flow) will be **\$12,500,000** per year.

2. The key point in this question is to understand that taxes are a business expense and this will affect your firm decisions — often where to locate. Once costs are specified correctly inclusive of taxes, you need to maximize firm profits and make your decision.

First, in the case of NYC, your costs will be:

$$\begin{aligned} TC &= 500Q + \text{Taxation} = 500Q + 250Q = 750Q \\ MC &= 750 \end{aligned}$$

Total Revenues from being in NYC, after specifying the demand curve as $P = 10,000 - Q$ will be:

$$\begin{aligned} TR = PQ &= (10,000 - Q)Q = 10,000Q - Q^2 \\ MR &= 10,000 - 2Q \end{aligned}$$

Maximize profits require $MR = MC$, thus:

$$\begin{aligned} MR &= 10,000 - 2Q = 750 = MC \\ Q^* &= 4625 \text{ items and the best price } P^* \text{ will be } \$5375 \end{aligned}$$

Firm profits in NYC will then be:

$$\Pi = TR - TC = (10,000 - 4625) \times 4625 - 750 \times 4625 = \$21,390,625$$

Second, were you to move the store to Greenwich, then you avoid the per unit tax, but you pay a lump-sum annual tax. Demand and revenues are the same as at the NYC location. Compute the new costs and calculate $MR = MC$ using the new costs. Now your costs are:

$$\begin{aligned} TC &= 500,000 + 500 \times Q \\ MC &= 500 \\ MR &= 10,000 - 2Q = 500 = MC \\ Q^* &= 4750 \text{ items in Greenwich and the best price } P^* \text{ will be } \$5250 \text{ per item.} \end{aligned}$$

Firm profits in Greenwich will now be:

$$\Pi = TR - TC = (10,000 - 4750) \times 4750 - 500,000 - 500 \times 4750 = \$22,062,500$$

Therefore, the Greenwich location is preferred. This is a general point in economics. You should prefer that tax structure that has the smallest incentive effects on personal and business decisions. Here the fixed tax does not affect efficient store sales, but rather just takes profits at the end as a lump-sum tax. Notice the prices are lower and the quantity sold is higher (and thus consumer surplus is higher, too) in Greenwich — the location with the better (less damaging) tax structure. Notice, too, that firms will locate where the economic damage is less as well. Thus, this puts pressure on city governments to adopt the more efficient tax, otherwise they will lose business.

I will relocate my store in Greenwich because profits are higher by \$1,171,875.

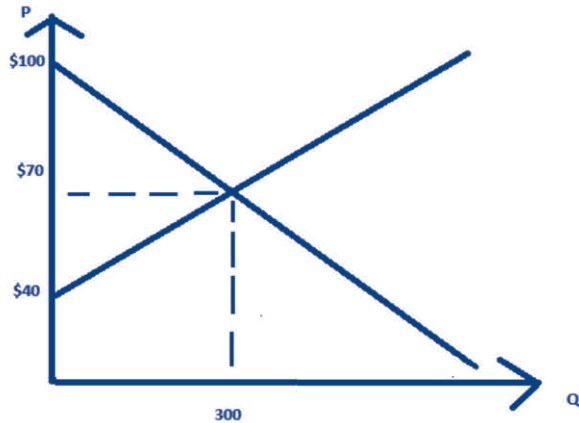
3. Here the point is to appreciate the economic advantages of markets to those who participate and to understand that if you can provide this service — be a market maker — then you can earn some money by charging for the use of the marketplace that you have created. First, compute the best market price and the quantity that will sell at the price. Then, compute the consumers' surplus earned by the Bakers' Guild and the producers' surplus earned by the Farmers' Cooperative. Consumers' surplus will be the maximum fee you can charge the Guild and the producers' surplus will be the maximum fee that you can charge the Cooperative. If you charge a little bit less than the maximum, everyone is better off — particularly you!

Best market price and quantity is found by setting quantity demanded (buyer's benefit) equal to quantity supplied (producers costs):

$$Q_s = 10 \times P_s - 400 = Q^* = 1000 - 10 \times P_d = Q_d$$

$$Q^* = 300 \text{ cartloads and } P^* = P_s = P_d = 70 \text{ guilders per cartload}$$

You can see this graphically as:



Now calculate consumer surplus earned by the Guild as the area under the demand (benefit) curve above the market price:

$$CS = .5 \times \text{Base} \times \text{Height} = .5 \times 300 \times (100 - 70) = 4500 \text{ Guilders}$$

Also calculate the producers' surplus earned by the Cooperative as the area above the supply curve (cost) below the market price.

$$PS = .5 \times \text{Base} \times \text{Height} = .5 \times 300 \times (70 - 40) = 4500 \text{ Guilders}$$

In your efficient market, you announce a market price of **70** guilders per cartload and **300** cartloads of wheat are exchanged at that price. You then charge the Farmers' Cooperative a lump-sum (fixed) fee of **4500 guilders minus a little bit** for your services and the Bakers' Guild a lump-sum (fixed) fee of **4500 guilders minus a little bit for your services**. In the end — after trade and paying your fee — everyone (including you) agree that market-making is a valuable service.

4. You need to do two things in this problem. First, figure out the market price for oranges in the Florida market. Then, given that price, manage your business. In managing your business, you need to decide whether to sell your oranges to the market at the market price and then whether to can, or not can, concentrate, or to keep your oranges to yourself and can concentrate. In the end, you will find that you should do both activities. Then Ernie arrives and asks if you want to protect your crop for \$300,000. The answer is NO, since the service he offers costs more than the added profits you earn from using the service.

First, compute the Florida market prices for oranges, first in a typical year and then for this cold winter. This is done by setting market demand equal to market supply in both circumstances.

Typical Year

$$P_s = .05 + .0028 \times Q_s = P^* = \$1 - .05 \times Q_d = P_d$$

$$\text{Thus } P^* = .10 \text{ and } Q^* = 17.99$$

Cold Winter Year

$$P_s = .10 + .0028 \times Q_s = P^* = \$1 - .05 \times Q_d = P_d$$

$$\text{Thus } P^* = .15 \text{ (or .1477 if you did not round) and } Q^* = 17.04$$

Now compute your average cost of a can of concentrate if you buy oranges from the market. This will be:

$$\text{Typical Year: } AC = 1 + 5 \times .10 = \$1.50$$

$$\text{Cold Winter Year: } AC = 1 + 5 \times .15 = \$1.75$$

$$\text{(or } AC = 1 + 5 \times .1477 = \$1.7385 \text{ if you did not round)}$$

Next compute your average cost of a can of concentrate if you use your own oranges, produced at a cost of \$.08/orange in a typical year and \$.13/orange in a cold winter year. This will be:

$$\text{Typical Year: } AC = 1 + 5 \times .08 = \$1.40$$

$$\text{Cold Winter Year: } AC = 1 + 5 \times .13 = \$1.65$$

Now you have all the data you need to make your decisions. You have three choices:

Strategy I: Sell oranges to the market and not can any concentrate.

Strategy II: Sell oranges to the market, then buy oranges from the market and can concentrate.

Strategy III: Keep your oranges within the “firm” and use them only to make your own concentrate.

What is your best strategy, first in a typical year and then in a cold winter year?

Typical Year

Profits from Strategy I: Sell 5 million oranges to the market at \$.10/orange. They cost you \$.08/orange to grow. Thus, your profits are $\Pi = TR - TC = 5,000,000(\$.10 - \$.08) = \$100,000$. You do not can concentrate (since you have no oranges) and therefore your profits will be just \$100,000.

Profits from Strategy II: Again, you sell your oranges to the market and make \$100,000. But now you also produce orange juice concentrate. But you need oranges. Where will you get them from? The market, of course, but at a cost of \$.10/orange. Still you make nice money. Your AC will be \$1.50 and you can sell each can for \$3.00, so $\Pi = TR - TC = 1,000,000(\$3.00 - \$1.50) = \$1,500,000$. Total profits from the Strategy II will be \$1,600,000.

Profits from Strategy III: Here you use the oranges you produce at \$.08 directly in production. Thus, AC of a can of concentrate will be \$1.40 and you can sell each can for \$3.00, so $\Pi = TR - TC = 1,000,000 (\$3.00 - \$1.40) = \$1,600,000$. Total profits from Strategy III will be \$1,600,000.

Either Strategy II or III is best. When might you prefer III? Well, if you have any doubts about orange quality from the market, this might raise the costs of using the market option. Or you can advertise that your firm uses only “home-grown” oranges grown on your family’s farm and picked by the tender hands of loving employees.

Cold Winter Year

Profits from Strategy I: Sell 5 million oranges to the market at \$.15/orange. They cost you \$.13/orange to grow. Thus, your profits are $\Pi = TR - TC = 5,000,000(\$.15 - \$.13) = \$100,000$. You do not can concentrate (since you have no oranges) and therefore your profits will be just \$100,000. (If you did not round up to the nearest penny, then $\Pi = 5,000,000(\$.1477 - \$.13) = \$88,500$).

Profits from Strategy II: Again, you sell your oranges to the market and make \$100,000. But now you also produce orange juice concentrate. But you need oranges. Where will you get them from? The market, of course, but at a cost of \$.15/orange. Your AC will be \$1.75 and you can sell each can for \$3.00, so $\Pi = TR - TC = 1,000,000(\$3.00 - \$1.75) = \$1,250,000$. Total profits from the Strategy II will be \$1,350,000. (If you did not round then selling the oranges will make \$88,500 and canning the concentrate will make you $\Pi = TR - TC = 1,000,000(\$3.00 - \$1.7385) = \$1,261,500$. But again your total profit will be \$1,350,000.

Profits from Strategy III: Here you use the oranges you produce at \$.13 directly in production. Thus, AC of a can of concentrate will be \$1.65 and you can sell each can for \$3.00, so $\Pi = TR - TC = 1,000,000 (\$3.00 - \$1.65) = \$1,350,000$. Total profits from Strategy III will be \$1,350,000.

Because of the cold growing season, my profits from growing oranges can canning concentrate will fall by \$250,000 because we can make \$1,600,000 in a typical year but only \$1,350,000 in a cold winter year.

What about Ernie’s offer? Well, he will lower your costs to \$.08/orange, but everyone else’s costs remain the same. This gives you a chance to make some extra money, it seems. How much extra?

Profits from Strategy II with Protection: Sell 5 million oranges to the market at \$.15/orange. But with protection, they cost you only \$.08/orange to grow. Thus, your profits are $\Pi = TR - TC = 5,000,000 (\$.15 - \$.08) = \$350,000$. (If you did not round up to the nearest penny, then $\Pi = 5,000,000(\$.1477 - \$.08) = \$338,500$.) Again, you also produce orange juice concentrate. But you need oranges, which you get from the market, but at a cost of \$.15/orange. Your AC will be \$1.75 and you can sell each can for \$3.00, so $\Pi = TR - TC = 1,000,000(\$3.00 - \$1.75) = \$1,250,000$. Total profits from the Strategy II will now be \$1,250,000 plus \$350,000 = \$1,600,000. (If you did not round, then selling the oranges will be \$338,500 and canning the oranges will make you $\Pi = TR - TC = 1,000,000(\$3.00 - \$1.7385) = \$1,261,500$. But again your total profit will be \$1,600,000). With Protection, you earn \$1.6 million but do not forget to subtract the price of protection which is \$300,000. **Thus, your net profits after paying for protection will be \$1,300,000.**

Profits from Strategy III with Protection: Here you use the oranges you produce at \$.08 directly in production. Thus, AC of a can of concentrate will be \$1.40 and you can sell each can for \$3.00, so $\Pi = TR - TC = 1,000,000(\$3.00 - \$1.40) = \$1,600,000$. Total profits from Strategy III will be

\$1,600,000. With Protection, you earn \$1.6 million but do not forget to subtract the price of protection which is \$300,000. **Thus, your net profits after paying for protection will be \$1,300,000.**

Ernie's Smudge Pot, Inc. offers to fully protect your orange groves — and thus keep production costs at \$0.8/orange — for a one year fee of \$300,000. Everyone else's costs rise so the Cold Winters supply of Oranges remains the same. You should **reject** this offer because you will only save \$250,000 but the protection costs \$300,000. Not worth it. **Your profits are \$1.3 million with protection and \$1.35 million without protection.**

5. Here you need to find the efficient mix of capital and labor to produce $Q = 120$ units of output. We know for efficiency that the following rule must be satisfied:

$$W/R = MP_L/MP_K$$

Where W = daily wage = \$100 and R is the daily rental cost of capital = \$900. You also need to compute MP_L = marginal product of labor and MP_K = marginal product of capital. We know the marginal products from the production functions:

$$MP_L = \frac{\partial Q}{\partial L} = .5 \times L^{-.5} K^{.5} = .5 \left(\frac{L^{.5} K^{.5}}{L} \right) = .5 \times \left(\frac{Q}{L} \right)$$

$$MP_K = \frac{\partial Q}{\partial K} = .5 \times L^{.5} K^{-.5} = .5 \left(\frac{L^{.5} K^{.5}}{K} \right) = .5 \times \left(\frac{Q}{K} \right)$$

And therefore:

$$MP_L/MP_K = K/L$$

Since

$$\frac{W}{R} = \frac{\$100}{\$900}, \text{ then:}$$

$$\frac{W}{R} = \left(\frac{1}{9} \right) = \left(\frac{K}{L} \right) = MP_L/MP_K$$

Or therefore:

$$L = 9K \text{ when we are efficient}$$

This result tells us what the efficient mix of capital and labor should be. Notice that the current mix: $L = 1600 > 81 = 9(K = 9)$; therefore the plant is now using way too much labor and way too little capital. What we need to know is the actual amount of K and L to use. This is found by knowing that we can't produce 120 units a day. Thus:

$$Q = 120 = L^{.5} K^{.5} \text{ which when we are efficient is } (9K)^{.5} K^{.5} = 3K$$

Therefore the efficient $K^* = 40$ machines. Knowing that $K^* = 40$, $L^* = 9 \times 40 = 360$ workers. What now are costs? Well,

$$TC = wL + rK = \$100 \times 360 + \$900 \times 40 = \$72,000$$

The efficient average cost per unit output when $Q = 120$ will therefore be:

$$AC = \$72,000/120 = \$600/\text{unit}.$$

To meet the firm production target of 120 units per day, I would recommend we hire **360** workers per day and lease **40** machines per day. This will lower our costs per unit of output to **\$600** per unit.

6. Here you want to treat the university like a business. They can charge a price — tuition — and make revenues which must be balanced against costs. First, compute TR and then TC and then maximize profits — net financial position.

Total Revenues:

$$TR = T \times Q \quad (25,000 - .5Q)Q = 25,000Q - .5Q^2$$

$$MR = 25,000 - Q$$

Total Costs:

$$TC = 152,000,000 + 5000Q$$

$$MC = 5000$$

$$MR = 25,000 - Q = 5000 = MC$$

$$Q^* = 20,000 \text{ and } T^* = 15,000$$

“Profits” or “Net Financial Position”

$$\Pi = TR - TC = (25,000 - .5 \times 20,000)20,000 - 152,000,000 - 5,000 \times 20,000 = \$48,000,000$$

To maximize the net financial position of the university, I recommend that the university set an annual tuition of **\$15,000** per student. Fortunately, this tuition is sufficient to cover the university's annual charges against fixed cost and, therefore, the President **will need hide from** the governor a net financial position of **\$48,000,000**.

7. In this problem, the city that gets the franchise will be the one that pays the most to the current owners. What each new franchise can afford to pay is that amount equal to or a bit less than the value of franchise in its location. To compute the value of the franchise in each location, we must compute annual profit earned in that location. This is the usual $MR = MC$ calculations for selling seats. Then add in the TV revenues (a fixed revenue item) and subtract the fixed stadium costs per year. Included in variable costs are the costs of players' salaries and other related variable expenses. Remember they play ten games.

Profits in L.A.

$$\begin{aligned}\text{TR from playing one game} &= PQ = (30 - .00005Q)Q = 30Q - .00005Q^2 \\ \text{MR} &= 30 - .0001Q\end{aligned}$$

$$\begin{aligned}\text{TVC from playing one game} &= 20Q \\ \text{MC} &= 20\end{aligned}$$

Profit Maximization for Each Game:

$$\begin{aligned}\text{MR} &= 30 - .0001Q = 20 = \text{MC} \\ Q^* &= 100,000 \text{ and } P^* = \$25\end{aligned}$$

Profits per Game from Ticket Sales

$$\text{TR} - \text{TVC} = PQ - 20Q = 2,500,000 - 2,000,000 = \$500,000/\text{Game}$$

Total annual profits of the L.A. franchise from the 10 game home season will now be:

$$\begin{aligned}\Pi &= \$500,000/\text{game} \times 10 \text{ games} + \text{TV revenues} - \text{Fixed Stadium Costs} \\ \Pi &= \$5,000,000 + \$20,000,000 - \$10,000,000 = \$15,000,000\end{aligned}$$

Assuming that this is the profit position of the team in perpetuity, we can calculate the value of the team to the L.A. owners as $(\$15\text{million}/.10) = \150 million when the alternative investment has a return of 10 percent per annum.

Profits in Oklahoma City

$$\begin{aligned}\text{TR from playing one game} &= PQ = (100 - .001Q)Q = 100Q - .001Q^2 \\ \text{MR} &= 100 - .002Q\end{aligned}$$

$$\begin{aligned}\text{TVC from playing one game} &= 10Q \\ \text{MC} &= 10\end{aligned}$$

Profit Maximization for Each Game:

$$\begin{aligned}\text{MR} &= 100 - .002Q = 10 = \text{MC} \\ Q^* &= 45,000 \text{ and } P^* = 55\end{aligned}$$

Profits from Ticket Sales

$$\text{TR} - \text{TVC} = PQ - 10Q = 2,475,000 - 450,000 = \$2,025,000/\text{Game}$$

Total annual profits of the Oklahoma City franchise from the 10-game home season will now be:

$$\begin{aligned}\Pi &= \$2,025,000/\text{game} \times 10 \text{ games} + \text{TV revenues} - \text{Fixed Stadium Costs} \\ \Pi &= \$20,250,000 + \$10,000,000 - \$5,000,000 = \$25,250,000\end{aligned}$$

Assuming this is the profit position of the team in perpetuity, we can calculate the value of the team to the OC owners as $(\$25.25 \text{ million}/.10) = \252.5 million when the alternative investment has a return of 10 percent per annum.

Now which city will get the franchise? The L.A. owners can offer only up to \$150 million to join the league — the value of their team — while the OC owners can offer up to \$252.5 million. So clearly the OC owners can outbid the L.A. owners. The franchise will go to Oklahoma City. Notice that while L.A. is a big market, they have a very elastic demand curve for football, given the number of competitive alternatives for the “entertainment dollar.” Well, in Oklahoma City, football may just be just about it, so the demand curve is very steep. Thus, the high ticket prices in OC. But how much will the OC owners pay to join? At least \$150 million to outbid L.A. and no more than \$252.5 million. That is the “bargaining range” with the current owners.

But what then will be the “franchise fee” to join the league? Since all this financial information is common knowledge, the current owners (the league) knows that the OC owners will pay up to \$252.5 million to join. So they give the OC owners an all-or-nothing offer of \$252.5 million minus \$1! Take it or leave it! OC owners take it. They join the league at a franchise fee of \$252,499,999 million.

Don’t feel bad for the OC owners, however, they are now a member of the “club” and will get to share in the franchise fees of the new teams that might join at a later date.

Oklahoma City will be awarded the new franchise and the owners in the winning city will pay no less than **\$150 million** and no more than **\$252.5 million** to the current league owners. In the end, I think **\$252.5 million minus \$1** will be paid to the league owners because *all the bargaining power lies with the current owners. They have the right to exclude Oklahoma City and they know Oklahoma City’s owners reservation price. This is nothing more than first degree discrimination.*

Economics of Managerial Decision Making (MGEC612)

SAMPLE EXAM (120 minutes in length)

1. Two manufacturers of television receivers, BIG and SMALL, compete in the market place. They each produce similar television sets of differing quality, but such quality differences are not readily apparent to the consumer. However, the manufacturers know the quality of their own products and have a good idea of the quality of their rival. The manufacturers are considering introducing warranties on their TVs in an attempt at signaling to the consumer their product's quality. The cost of providing a warranty differs for the two manufacturers:
 - BIG makes HIGH quality TV's and its cost of providing a warranty is \$225 per year.
 - SMALL makes LOW quality TV's and its cost of providing a warranty is \$300 per year.

The following chart shows the reservation prices that consumers would place on TV sets of HIGH and LOW quality, together with their valuation of any eventual warranties offered on those sets, **if consumers knew the underlying quality**.

	Reservation Price on TV	Reservation Price on Warranty
HIGH QUALITY	\$1,000	\$100 for each year of warranty
LOW QUALITY	\$500	\$200 for each year of warranty

Note that while costs and benefits of the warranty are expressed in terms of years, the firms are in fact able to offer partial-year-long warranties.

Consumers will assume that the firm that offers the better (i.e., longer) warranty must sell the HIGH quality product. The product with the inferior (i.e., shorter) warranty, or no warranty at all, is assumed to be of LOW quality.

- a. BIG will sell its TV at a price of _____ and will have a warranty of _____ years (include the value of any warranty in the sale price)
 - b. SMALL will sell its TV at a price of _____ and will have a warranty of _____ years (include the value of any warranty in the sale price)
2. **Membership plan for traffic violation fines?**

In a 2010 entry on the website freakonomics.com, Ian Ayres describes a new Internet-based insurance service:

"A couple weeks ago, I became briefly fascinated and somewhat appalled by the appearance of a new Internet business that offered a sort of insurance against speeding tickets. In return for an annual fee

of \$169, ticketfree.org promised to reimburse you for the costs of up to \$500 in moving violations. Its webpage enthused:

- We don't promise that you won't get a ticket; we just promise that you won't have to pay for it.
- Never pay another ticket again. Period!
- Never pay late fees on tickets.
- Never worry about speed traps or radar while driving.
- Never need an expensive ticket lawyer.
- Never have a take a day off work to fight a ticket."

Upon receiving a qualifying ticket, members simply visit the Ticketfree site and enter the details; the company will then pay the associated fine and send the member a confirmation email. Drivers continue, of course, to be at risk of incurring "points" toward the suspension of their license or increases in their car insurance premia. Not covered by Ticketfree's base plan are parking or red-light tickets.

Note that more than 41 million speeding tickets are issued to drivers in the United States each year, equivalent to one in every six drivers receiving a ticket. The average cost of a speeding ticket is USD 150 each, according to TrafficTicketSecrets.com.

The Ticketfree service has since been discontinued. What might have been the economic challenges to the viability of their business model?

- 3.** You are the CEO of a closely-held family firm and, in order to acquire control, you wish to buy shares and become the majority shareholder. There are currently three shareholders. Each holds a different assessment about the value of the firm and has a different supply function for selling shares. The shareholders act as price takers so that these supply functions can be interpreted as the minimum price, p , at which they would sell a quantity, q , of shares.

Shareholder A:	$p_A = 20 + 2q_A$	Number of shares held = 10
Shareholder B:	$p_B = 28 + q_B$	Number of shares held = 10
Shareholder C:	$p_C = 4 + 2q_C$	Number of shares held = 20

You can achieve your objective of becoming the majority shareholder by buying 20 shares.

You plan to conduct an ascending auction to buy the 20 shares where you announce a price p and bidders state how many shares they are willing to sell at that price p . If the total numbers of shares offered at p is less than 20, then you announce a higher price and keep increasing p until the total offer has reached 20 shares. All bidders sell their shares at the same final price.

a. Derive an expression for the total number of shares Q that you can expect to be offered at a given offer price p .

b. What price per share will you pay to buy the needed 20 shares?

c. At this price, how many shares will you buy from

Shareholder A:

Shareholder B:

Shareholder C:

4. The Politics of Lithium

Suppose that the market demand, Q , for Bolivian Andes lithium is given by

$$Q = 1200 - P$$

where P is the price per unit. This lithium can be extracted at no cost by just two firms, one Japanese and one French. Each firm recognizes its own market power and, therefore, the impact of its own production on price. The two firms compete simultaneously in choosing production capacities.

The government's current ruling party, the Movement for Socialism (MAS), is not a fan of free enterprise, however, and is considering nationalizing the firms by taking them over and running them as a single monopoly. Fearing international backlash, it plans to compensate each firm for one year of lost profits. Any leftover profit is used to pay for a new farming program.

a. How much would the MAS have to pay each firm as part of its nationalization?

b. How much money would the MAS have left over for its new farm program?

5. Learning about Strategy: The Anglo-Irish Bond Redemption Offer

THIS QUESTION HAS TWO PARTS CONTAINED IN THE NEXT PAGES.

Briefly read the 2011 *Financial Times* article below. Do not fret about specific details and do not worry if you fail to capture some of the aspects right now. The questions below walk you through the strategic problem in the article.

Anglo Irish bondholders face dilemma

In the classic game theory case of the prisoner's dilemma, two parties can either co-operate for some mutual gain, or each can sell out the other in the hope of a higher individual reward — but with the risk of losing everything if the other beats them to it.

This is the choice facing Anglo Irish junior bondholders when they vote this Friday on an exchange offer that, if approved, would see them receive just 20 per cent of the face value of their bonds.

Bondholders could work together to vote down the deal and force the bank to the negotiating table in the hope of a better offer – just as two theoretical prisoners who each stick to their agreed cover story can ensure neither is found to have committed the crime.

But those bondholders who vote against a deal on their own also risk losing virtually everything as the deal contains a “sweeper” clause where acceptance also counts as a vote to allow the bank to “sweep up” any hold-out investors for just one cent per €1,000 of bonds held.

In other words, if enough investors opt to take the 20 per cent on offer, they in effect sell out their fellow bondholders.

“To a degree there is a camaraderie among investors in an effort to find a better deal and resist this sweep, but on the other hand no one wants to be the last into that room and get swept up,” says one liability management expert.

Part I: Using Game Theory to Analyze the Anglo-Irish Bondholder Problem

We will make some simplifications to understand the strategic issues. Assume that there are only two investors who own all outstanding bonds: Paddy (who owns 50% of the bonds) and Brittany (who owns the other 50%). The redemption offer will be approved with a simple 50% majority: if at least one investor decides to accept the Anglo-Irish redemption offer, the deal moves ahead with Anglo-Irish buying all bonds from the seller(s) at 20% of the bonds' face value, but applying the “sweeping clause” to a bondholder who rejected the offer.

Assume that both Paddy and Brittany have the same publically-known expectations about the future value they can extract from an alternative deal with Anglo-Irish. Concretely, they expect to obtain 50% of their bonds' face value in future negotiations if they reject the current offer. The payoff matrix — expressing payoffs as the *expected* cash obtained for a single bond with a face value of €1000 — looks as follows:

		Brittany	
		Accept Redemption Offer	Reject Redemption Offer
Paddy	Accept Redemption Offer	200, 200	200, 0.01
	Reject Redemption Offer	0.01, 200	500, 500

a. Is there a dominant strategy for Brittany? If so, what is it?

b. Circle the Nash equilibrium/equilibria of this game in the above payoff table.

Now assume that Brittany is more pessimistic and expects to collect only €150 if the redemption offer is not accepted. The payoff matrix now looks as follows:

		Brittany	
		Accept Redemption Offer	Reject Redemption Offer
Paddy	Accept Redemption Offer	200, 200	200, 0.01
	Reject Redemption Offer	0.01, 200	500, 150

c. Is there a dominant strategy for Brittany? If so, what is it?

d. Circle the Nash equilibrium/equilibria of this game in the above payoff table.

Now assume that Brittany and Paddy have the same low expectations about payoffs were they to both reject the redemption offer (€150).

		Brittany	
		Accept Redemption Offer	Reject Redemption Offer
Paddy	Accept Redemption Offer	200, 200	200, 0.01
	Reject Redemption Offer	0.01, 200	150, 150

e. Circle the Nash equilibrium/equilibria of this game in the above payoff table.

Note that we have covered all potential strategic scenarios: a majority of parties have expectations above the Anglo-Irish offer; parties are split in opinions; or a majority of the parties have expectations below the offer.

- e. Given what we have learnt in considering these scenarios, has the FT writer taken MGEC611/612? Or in other words: could this situation ever be called a “Prisoner’s Dilemma”? Briefly argue your answer.**

Part II: Using Asymmetric Information and Expected Utility to Understand the Offer

Now, let’s introduce some uncertainty to this game. Assume that everyone knows that Paddy believes the future offer to be €500 if all bondholders hold firm now. However, Brittany’s expectations over payoffs in the scenario where both parties reject the redemption offer are less well understood.

Paddy estimates that with probability $p=0.5$, Brittany’s value of holding out is €150 (in which case she will accept the offer for sure), and with probability $1 - p=0.5$ Brittany’s value is €500 (in which case assume that Brittany will reject the offer for sure).

- a. What is Paddy’s expected value of rejecting Anglo-Irish’s offer?**
 - b. What assumption do you require about Paddy’s behavior under uncertainty to make him want to accept Anglo-Irish’s offer?**
 - c. Consider the lessons from the questions in parts I and II. Briefly describe Anglo-Irish’s strategy of using the sweeping-clause. How does it take advantage of asymmetric or dispersed information in strategic situations?**
- 6. The market for Natural Gas in the country of CELTIC comprises a dominant producer and 100 identical smaller producers.**

The market demand for natural gas in CELTIC is

$$P = 36 - 2Q$$

The marginal cost of the leading firm, TARTAN GAS (T), is

$$MC_T = 2Q_T$$

Aggregated across all small producers, the marginal cost of the fringe is

$$MC_s = 4 + \frac{2}{3}Q_s$$

The smaller firms look to TARTAN GAS to select its capacity and, in effect, determine the market price. The smaller firms then act as price takers in their production decisions.

- a. What is the price of natural gas in CELTIC?**
- b. How much will be supplied by TARTAN GAS?**
- c. How much will be supplied by each of the small firms?**

Sample Exam Answers MGEC612

1. First, note that the cost to each firm of offering a warranty exceeds any additional revenue it can obtain from selling with a warranty. So whichever firm does not offer the better warranty will be perceived as selling an inferior product and will choose not to offer a warranty

BIG

- If BIG is able to offer the best warranty, its TV will sell for 1000 plus the cost of the warranty which is 100Y
- If BIG does not offer the best warranty, it will sell with no warranty for 500
- So the gain from offering the best warranty $(1000 + 100Y) - 500 = 500 + 100Y$
- The cost of a warranty to BIG is 225Y
- So the MAXIMUM warranty the BIG will offer is determined where the benefit equals the cost

$$500 + 100Y = 225Y \quad \text{so} \quad Y < 500/125 = 4 \text{ years}$$

SMALL

- If SMALL is able to offer the best warranty, its TV will sell for 1000 plus the cost of the warranty which is 100Y
- If SMALL does not offer the best warranty, it will sell with no warranty for 500
- So the gain from offering the best warranty $(1000 + 100Y) - 500 = 500 + 100Y$
- The cost of a warranty to SMALL is 300Y
- So the MAXIMUM warranty the BIG will offer is determined where the benefit equals the cost

$$500 + 100Y = 300Y \quad \text{so} \quad Y < 500/200 = 2.5 \text{ years}$$

So, all BIG needs to do is to offer a warranty of 2.5+ years to beat SMALL. BIG will not choose any longer than necessary, because the additional revenue from each extra year of the warranty is only 100 but its cost is 225.

**So, Big will offer a 2.5+ warranty and sell its TV for $1000 + 250+ = 1250+$
 Small will offer no warranty and sell its TV for 500**

2. Ticketfree faces both a moral hazard and an adverse selection problem.

- Adverse selection: the service is attractive primarily to drivers who know that they have a much higher propensity than the average driver of receiving multiple tickets in a year. With a selection of more risky drivers than average, Ticketfree is likely to have to pay out more in ticket charges than its membership dues, even though the average driver's chance of receiving a ticket in a given year is low.

- Moral hazard: as with other insurance, a worry is that members will engage in more risky driving and receive more tickets than the average driver would; people who are insured against the cost of speeding tickets are more likely to speed.

3. a. Rewrite the supply functions in quantity form

$$\begin{array}{rcl}
 q_A & = & -10 + 0.5p_A & \text{for shareholder A;} \\
 q_B & = & -28 + p_B & \text{for shareholder B;} \\
 q_C & = & -2 + 0.5p_C & \text{for shareholder C;} \\
 \hline
 \text{TOTAL SUPPLY} & & Q = -40 + 2P &
 \end{array}$$

b. So the buyback price for 20 shares is $P = 30$ (i.e., $20 = -40 + 2P$)

$$\begin{array}{rcl}
 \text{c. A will sell} & -10 + 0.5p_A & = 5 \\
 \text{B will sell} & -28 + p_B & = 2 \\
 \text{C will sell} & -2 + 0.5p_C & = 13
 \end{array}$$

4. a. Cournot Equilibrium

Competition is initially in a Cournot (not Bertrand) setting because firms recognize the impact that their choice of output has on the market price. The Cournot equilibrium is found by using the reaction curves of the two firms to solve for levels of output. The reaction curve for firm 1 is found as follows:

$$\text{Rearranging: } P = 1200 - Q$$

$$\begin{array}{rcl}
 TR_1 & = & PQ_1 = (1,200 - Q)Q_1 \\
 & = & 1,200Q_1 - (Q_1 + Q_2)Q_1 \\
 & = & 1,200Q_1 - Q_1^2 - Q_2Q_1 \\
 MR_1 & = & 1,200 - 2Q_1 - Q_2
 \end{array}$$

Set $MR_1 = MC_1 = 0$ and solve for Q_1 to get firm 1's reaction function:

$$Q_1 = 600 - (1/2)Q_2 \quad (1)$$

Going through the same calculations for firm 2 yields firm 2's Reaction function:

$$Q_2 = 600 - (1/2)Q_1 \quad (2)$$

Solving (1) and (2) simultaneously for Q_1 and Q_2 yields: $Q_1 = Q_2 = 400$. Thus the total output is 800 and the price will be \$400. So the profit for each firm is $TR - TC = 400(400) - 0 = 160,000$.

Hence, the MAS would have to pay each firm 160,000 (for a total of 320,000).

4. b. Monopoly

$$TR = PQ = (1200 - Q)Q = 1200Q - Q^2, \text{ where } Q = Q_1 + Q_2$$

$$MR = 1,200 - 2Q$$

$$\text{Set } MR = MC = 0:$$

$$1,200 - 2Q = 0$$

$$Q = 600$$

$$P = 1,200 - 600 = 600$$

So total profit is $600(600) = 360,000$.

Hence, the MAS would have 40,000 ($360,000 - 320,000$) left over for its new farm program.

5. Part I**a. NO**

		Brittany	
		Accept Redemption Offer	Reject Redemption Offer
Paddy	Accept Redemption Offer	200, 200	200, 0.01
	Reject Redemption Offer	0.01, 200	500, 500

c. YES ACCEPT

		Brittany	
		Accept Redemption Offer	Reject Redemption Offer
Paddy	Accept Redemption Offer	200, 200	200, 0.01
	Reject Redemption Offer	0.01, 200	500, 150

		Brittany	
		Accept Redemption Offer	Reject Redemption Offer
Paddy	Accept Redemption Offer	200, 200	200, 0.01
	Reject Redemption Offer	0.01, 200	150, 150

- f. The FT writer did not take MGEC611/612: this is never a prisoner's dilemma. In the prisoner's dilemma you have to have a situation that is not a Nash equilibrium and in which both players would be better off by cooperating (compared to the actual Nash equilibrium): this is never the case in any of the potential scenarios!

Part II

- a. $\frac{1}{2} * 500 + \frac{1}{2} * 0.01 = 250.005$
- b. You need Paddy to be quite risk-averse. Otherwise he takes his chances for an expected value of 250 which is better than the 200 he gets by accepting the redemption offer.
- c. You are using the risk aversion of the agents and "playing each against each other" in order to ensure that most of them will accept the offer (you could also think about the situation where Brittany is also uncertain!

6. STEP 1

The supply curve of the following firms is calculated by summing the individual supply curves

$$MC_s = 4 + \frac{2}{3}Q_s$$

But we must convert to quantities

$$Q_s = -6 + 1.5 P$$

STEP 2

Find leader's supply by subtracting follower supply from market demand

$$\begin{array}{rcl} Q_M & = & 18 - 0.5 P \\ \text{Minus } Q_S & = & -6 + 1.5 P \\ \hline Q_T & = & 24 - 2 P \end{array} \quad \text{OR} \quad P = 12 - 0.5 Q_T$$

STEP 3

Find leader's output and price

$$\begin{aligned} P &= 12 - 0.5 Q_T \\ MR &= 12 - Q_L = 2 Q_T = MC_T \\ Q_T &= 4 \quad \text{AND} \quad P = 12 - 0.5 Q_T = 10 \end{aligned}$$

STEP 4

Find followers' supply where $P = MC$

$$Q_F = -6 + 1.5 P = 9 \quad \text{so each firm supplies } 9/100$$

STEP 5

Check total supply = total demand at price of 10. From market demand curve

$$P = 36 - 2Q_M \quad 10 = 36 - 2(4 + 9)$$

a. 10

b. 4

c. 9/100

Operations Management: Quality and Productivity (OPIM611)

FINAL EXAM

■ Instructions

The exam is open book/open notes and you may use a calculator. We will give points for correct answers, but will not subtract points for incorrect answers, so you should answer all questions.

In order to make your calculations as straightforward as possible, assume that, **unless stated otherwise**,

1. there are sufficient parts or raw materials so that the initial operation(s) are never starved;
2. processing times have negligible variability, and over time, workers neither speed up nor slow down, but work always at the processing rates given;
3. there are no machine breakdowns;
4. when there are buffers shown, they are large enough to accommodate any amount of inventory that would reside in those buffers under normal operations;
5. travel time and time to transport parts from one operation to the next is negligible;
6. all operations run with 100% yield, i.e., the operations produce no defective units; and
7. all processes are in steady state (e.g., in the middle of the day); thus, you may ignore any start-up effects.

EXAM SCORE

COURSE GRADE

PART A**Mr. K's Hair Salon**

Mr. K's is a very popular hair salon. It offers high-quality hair-styling and physical relaxation services at a reasonable price, so it always has unlimited demand. The service process includes five activities that are conducted in the sequence described below. (The time required for each activity is shown in parenthesis):

Activity 1: Welcome a guest and offer homemade herb tea. (10 minutes)

Activity 2: Wash and condition hair. (10 minutes)

Activity 3: Neck, shoulder, and back stress release massage. (10 minutes)

Activity 4: Design the hair style and do the hair. (25 minutes)

Activity 5: Check out the guest. (5 minutes)

Three servers (S1, S2, and S3) offer the services in a worker-paced line. The assignment of tasks to servers is the following:

S1 does Activity 1.

S2 does Activities 2 and Activity 3.

S3 does Activities 4 and Activity 5.

1. Which server is the bottleneck of the process?
2. What is the utilization of server 2?
3. What is the average labor utilization of the servers? Assume the process operates at its capacity.
4. Assume a wage rate of \$18 per hour. What are the direct labor costs for one guest?

To increase the service rate, Mr. K's is considering two alternatives:

Alternative I: To hire a new employee to help any one (and only one) of the servers without changing the tasks performed by each server.

Alternative II: To redesign the assignment of tasks to servers. For this, Mr. K's is evaluating to reassign Activity 5 from S3 to S1.

5. What would be the costs of direct labor of serving one guest under each of the two alternatives? Assume that the system operates at its capacity.

PART B**Penne Pesto**

Penne Pesto is a small restaurant in the financial district of San Francisco. Customers order from a variety of pasta dishes. The restaurant has 50 seats and is always full during the four hours in the evening. It is not possible to make reservations at Penne, most guests show up spontaneously on their way home from work. If there is no available seat, guests simply move on to another place.

On average, a guest spends 50 minutes in the restaurant, which includes 5 minutes until the waiter has taken the order, an additional 10 minutes until the food is served, 30 minutes to eat, and 5 minutes to handle the check-out (including waiting for the check, paying, and leaving). It takes the restaurant another 10 minutes to clean the table and have it be ready for the next guests (of which there are always plenty). The average guest leaves \$20 at Penne, including food, drink, and tip (all tips are collected by the restaurant, employees get a fixed salary).

The restaurant has 10 waiters and 10 kitchen employees, each earning \$90 per evening (including any preparation, the 4 hours the restaurant is open, and clean-up). The average order costs \$5.50 in materials, including \$4.50 for the food and \$1 for the average drink. In addition to labor costs, fixed costs for the restaurant include \$500 per day of rent and \$500 per day for other overhead costs.

The restaurant is open 365 days in the year and is full to the last seat even on week-ends and holidays. There are about \$200k of capital tied up in the restaurant, largely consisting of furniture, decoration, and equipment.

1. How many guests will the restaurant serve on an evening?
2. What is the Return on Invested Capital for the owner of the restaurant?
3. Assume that you could improve the productivity of the kitchen employees and free up one person who would be helping cleaning up the table. This would reduce the clean-up to 5 minutes instead of 10 minutes. What would be the new ROIC?
4. What would be the new ROIC if over-head charges could be reduced by \$100 per day? Answer this question independent of the previous question.

PART C**ProofSmart Inc.**

ProofSmart Inc., a supplier of home insulation materials, was burned down in a recent fire. From the remains of what used to be the accounting ledger, the following information was recovered:

	2006	2007
Inventory	\$2,367,121	\$2,418,257
Gross Margin	42%	45%
Inventory Turns	11	[unreadable]

Prior to the fire, ProofSmart saw a sales growth of 48% in 2007, a record performance for the 18 year-old company. (NOTE: Gross margin is defined as $1 - (\text{COGS}/\text{Sales})$.)

1. What was the sales for 2007?
Circle the answer closest to the correct answer.
 - a. \$318,000
 - b. \$38,000,000
 - c. \$43,000,000
 - d. \$66,000,000
 - e. \$85,000,000
 - f. cannot be determined from the data given

2. What was the inventory turns for 2007?
Circle the answer closest to the correct answer.
 - a. 10
 - b. 11
 - c. 12
 - d. 13
 - e. 14
 - f. 15
 - g. cannot be determined from the data given
 - h. none of the above

PART D**Toyota and Capital One Cases**

1. In the Toyota Production System, *jidoka* refers to
 - a. Level production, where different models are produced along side each other on the assembly line
 - b. Continuous improvement, where workers organize meetings to discuss ways of improving the production process
 - c. The inventory retrieval system where parts are replenished only when they are needed
 - d. The aggressive reduction of changeover and setup times
 - e. Continuous line-balancing to maximize utilization
 - f. The cross-training of workers for a wide range of skills
 - g. None of the above
2. Which of the following statements accurately describe the Toyota Production System?
 - I. The entire production is shut down every time the andon cord is pulled
 - II. There is zero idle time at each production step
 - III. The TPS uses no buffers
 - IV. TPS uses buffer inventories between line segments to avoid blocking and starving of the production line
 - a. I only
 - b. II only
 - c. III only
 - d. IV only
 - e. I, II, III and IV
 - f. II and IV
 - g. II, III and IV
 - h. I and IV
3. In the case of Capital One where is the bottleneck found?
 - a. Q&A
 - b. Closing
 - c. Underwriting
 - d. Interviewing
 - e. There was no bottleneck

PART E**The Right to Vote (and Not to Wait)**

In the previous two presidential elections in the United States, very long wait times have been witnessed at precincts (voting stations) in states that ultimately decided the election (Florida in 2000 and Ohio in 2004).

In Philadelphia as well, some voters complained about the long lines in some precincts, with most complaints coming from precinct A. In 2004, the average number of voters arriving at Precinct A was of 35 per hour and the arrivals of voters was random with inter-arrival times that had a coefficient of variation of 1 ($CV_a=1$).

Philadelphia had deployed 1 voting machine in Precinct A. Suppose that each voter spent on average 100 seconds in the voting booth (this is the time needed to cast her/his vote using a voting machine), with a standard deviation of 120 seconds.

1. How long on average a voter had to wait in line precinct at A in 2004 *before* entering in a booth to cast her/his vote. Circle the closest answer.
 - a. 56 minutes
 - b. 58 minutes
 - c. 60 minutes
 - d. 62 minutes
 - e. 71 minutes
 - f. 75 minutes
 - g. There is not sufficient information to answer the question

Given the long wait times for Precinct A, the city of Philadelphia is thinking of alternative solutions to improve voting conditions. One of the proposed solutions is as follows.

Proposal 1: Deploy an additional voting machine in precinct A.

Assume that the voter turnout is expected to have similar characteristics in 2008 as in the previous election.

2. Under Proposal 1, how long on average would a voter have to wait in line in precinct A in 2008 before casting her/his vote. Circle the closest answer.
 - a. 1 minute
 - b. 5 minutes
 - c. 6 minutes
 - d. 10 minutes
 - e. 11 minutes
 - f. There is not sufficient information to answer the question

3. Under Proposal 1, on average, at precinct A, what would be the ratio of the average number of people voting (at a booth) over the average number of people in the line (waiting). Circle the closest answer.
- a. 0.4
 - b. 1.4
 - c. 2.4
 - d. 3.4
 - e. 4.4
 - f. 5.4
 - g. There is not sufficient information to answer the question
4. Suppose Proposal 1 is rejected and that only one machine will be deployed in precinct A. In sign of protest, voters at precinct A decide to adopt the following rule: if the voting machine is busy, the voter will not vote and will leave (and not vote at all). What is the expected number of people who will end up voting on election day in precinct A (assume that the voting station accepts voters for 12 hours from 8:00am to 8:00pm)
- a. Less than 100
 - b. Between 100 and 150
 - c. Between 150 and 250
 - d. More than 250
 - e. There is not sufficient information to answer the question

PART F**Airport Massage Station**

A small company just opened a new massage station at Philadelphia airport. The company has a stand that offers massages to travelers. Customers can select a length of massage between 5 and 20 minutes and there is a unique rate of \$30 independently of the length selected by customers. The average length of massage requested by customers is of 15 minutes with standard deviation of 10 minutes.

There are four employees delivering massages. The average number of potential customers requesting a massage is of 20 per hour. The inter-arrival times are assumed to be exponentially distributed.

If no spot is available when the customer arrives, s/he leaves in order not to risk missing her/his flight.

1. What is average number of customers being serviced per hour at the massage station? Circle the closest answer.
 - a. 7
 - b. 8
 - c. 9
 - d. 10
 - e. 11
 - f. 12
 - g. 13
 - h. There is not sufficient information to answer the question
2. The station manager is considering the option of hiring additional employees to deliver massages. The hourly wage of an employee is \$50/hr. How many ADDITIONAL employees should s/he hire if s/he wants to maximize profits?

[Profit = revenues from customers – labor cost]

Suppose that there exists sufficient equipment to accommodate as many new employees as needed.

- a. none
- b. 1 additional employee
- c. 2 additional employees
- d. 3 additional employees
- e. 4 additional employees
- f. There is not sufficient information to answer the question

2. What is the implied utilization (ratio of workload relative to capacity) at “Scan Film”
- a. less than 50%
 - b. 50% to 60%
 - c. 60% to 70%
 - d. 80% to 90%
 - e. 90% to 100%
 - f. more than 100%
3. Fixing the relative proportions of job types, what is the largest number of jobs per hour that OCP can handle? Circle the answer closest to the correct answer.
- a. 10
 - b. 11
 - c. 12
 - d. 13
 - e. 14
 - f. 15
 - g. 16
 - h. 17
 - i. 18

PART H**TaxInc**

TaxInc is a small company that offers tax advice by phone. Customers call to ask questions when filling their tax returns.

The calls can be classified into two types: simple and complex. Simple calls have to go only through Agent 1 while complex calls have to go through both Agent 1 and Agent 2. 2/3 of the total incoming calls are simple.

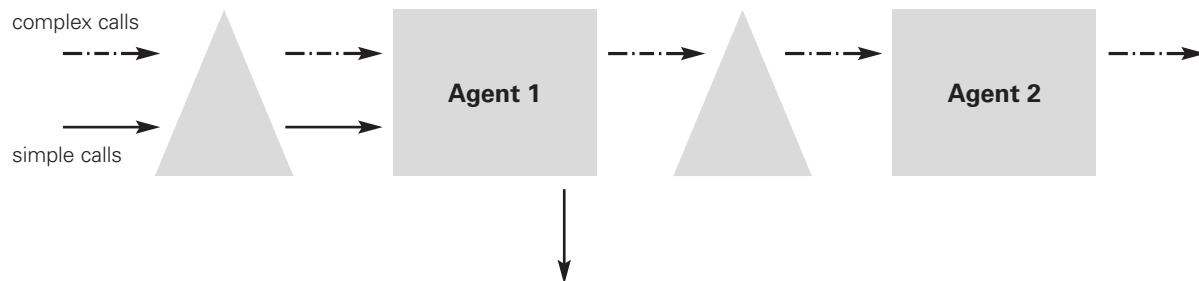
When a customer calls, s/he waits in line until Agent 1 becomes available. After receiving service from Agent 1, two cases can occur. If the call is a simple case, the customer leaves. If the call is complex, the customer joins a queue in front of Agent 2 until the latter becomes available. All calls are processed in the order of their arrival (FCFS: First Come First Serve)

The following data is available:

The average number of calls waiting for Agent 1 is 5 and is the average number of calls waiting for Agent 2 is 3.

The average number of incoming calls (including simple and complex ones) is 30 per hour.

The service time at both agents is assumed to have a coefficient of variation of $CV_p=1$.



1. How long does a customer with a simple call wait, on average, before speaking to Agent 1?

- a. 5 minutes
- b. 10 minutes
- c. 15 minutes
- d. 30 minutes
- e. 35 minutes
- f. 40 minutes
- g. There is not sufficient information to answer the question

2. Consider a customer with a complex case (i.e., that goes through Agent 1 and 2). How long would s/he spend *waiting* on the line between the time s/he calls and the time s/he hangs up (this time does not include the time spent speaking to Agents 1 and 2)
- a. 16 minutes
 - b. 20 minutes
 - c. 22 minutes
 - d. 28 minutes
 - e. 34 minutes
 - f. 45 minutes
 - g. There is not sufficient information to answer the question

PART I

Kick Scooters

Metal frames for kick scooters are manufactured in two steps: Stamping and assembly. Each frame is made up of three pieces: one unit of part A and two units of part B.

The parts are fabricated by a single stamping machine that requires a set up time of 90 minutes switching between two part types. Once the machine is set up, the activity time for parts, regardless of type, is 30 seconds each piece. Currently, the stamping machine rotates its production between one batch of 120 part A's and 240 part B's. Completed parts move only when the entire batch is produced.

At assembly, parts are assembled manually to form the finished products. The three parts and a number of small purchased components are required for each unit of final product. Each product requires 30 minutes of labor time to assemble. There are 12 workers in assembly. There is sufficient demand to sell every scooter the system can make.

1. At the current batch sizes, the bottleneck of the system is
- a. Stamping
 - b. Assembly
 - c. They both have the same capacity
 - d. Cannot be determined

2. At the current batch sizes, what is the process capacity in units per hour? Circle the answer below that is closest to the correct answer. A unit refers to a complete scooter frame (i.e. one part A and two parts B).
- a. 1 units/hour
 - b. 5 units/hour
 - c. 10 units/hour
 - d. 20 units/hour
 - e. 30 units/hour
 - f. 40 units/hour
3. One way to increase process capacity is to
- a. increase the batch size at the Stamping step
 - b. decrease the batch size at the Stamping step
 - c. add more workers at Assembly
 - d. none of the above
4. Which batch size for the stamping machine would minimize inventory without decreasing the current flow rate? Circle the answer below that is closest to the correct answer.
- a. 60 sets
 - b. 120 sets
 - c. 180 sets
 - d. 240 sets
 - e. 300 sets

APPENDIX

The *Erlang Loss Function Table* contains the probability that a process step consisting of m parallel resources contains m flow units, i.e. all m resources are utilized. Inter-arrival times of flow units (e.g., customers or data packets, etc.) are exponentially distributed with mean a , and service times have a mean p (service times do not have to follow an exponential distribution).

Because there is no buffer space, if a flow unit arrives and all m servers are busy, then that arriving flow unit leaves the system un-served (i.e., the flow unit is lost). The columns in the table correspond to the number of resources, m , and the rows in the table correspond to $r=p/a$, i.e. the ratio between the service time and the interarrival time. The following two pages include two tables, one for small values of r and one for larger values of r .

Example: Find the probability, $P_m(r)$, that a process step consisting of 3 parallel resources must deny access to newly arriving units. Flow units arrive one every $a=3$ minutes with exponential interarrival times and take $p=2$ minutes to serve. First, define $r=p/a=2/3=0.67$ and find the corresponding row heading. Second, find the column heading for $m=3$. The intersection of that row with that column is $P_m(r)=0.0255$.

Note that $P_m(r)$ can be computed directly based on the following formula

$$\text{Probability \{all } m \text{ servers busy\}} = P_m(r) = \frac{\frac{r^m}{m!}}{1 + \frac{r^1}{1!} + \frac{r^2}{2!} + \dots + \frac{r^m}{m!}} \quad (\text{Erlang loss formula})$$

The exclamation mark (“!”) in the equation refers to the factorial of an integer number. To compute the factorial of an integer number x , write down all numbers from 1 to x and then multiply them with each other. For example, $4! = 1 \times 2 \times 3 \times 4 = 24$. This calculation can be done with the Excel function FACT(x).

Erlang Loss Table

	<i>m</i>									
	1	2	3	4	5	6	7	8	9	10
0.10	0.0909	0.0045	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.20	0.1667	0.0164	0.0011	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.25	0.2000	0.0244	0.0020	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.30	0.2308	0.0335	0.0033	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.33	0.2500	0.0400	0.0044	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.40	0.2857	0.0541	0.0072	0.0007	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
0.50	0.3333	0.0769	0.0127	0.0016	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000
0.60	0.3750	0.1011	0.0198	0.0030	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000
0.67	0.4000	0.1176	0.0255	0.0042	0.0006	0.0001	0.0000	0.0000	0.0000	0.0000
0.70	0.4118	0.1260	0.0286	0.0050	0.0007	0.0001	0.0000	0.0000	0.0000	0.0000
0.75	0.4286	0.1385	0.0335	0.0062	0.0009	0.0001	0.0000	0.0000	0.0000	0.0000
0.80	0.4444	0.1509	0.0387	0.0077	0.0012	0.0002	0.0000	0.0000	0.0000	0.0000
0.90	0.4737	0.1757	0.0501	0.0111	0.0020	0.0003	0.0000	0.0000	0.0000	0.0000
1.00	0.5000	0.2000	0.0625	0.0154	0.0031	0.0005	0.0001	0.0000	0.0000	0.0000
1.10	0.5238	0.2237	0.0758	0.0204	0.0045	0.0008	0.0001	0.0000	0.0000	0.0000
1.20	0.5455	0.2466	0.0898	0.0262	0.0063	0.0012	0.0002	0.0000	0.0000	0.0000
1.25	0.5556	0.2577	0.0970	0.0294	0.0073	0.0015	0.0003	0.0000	0.0000	0.0000
1.30	0.5652	0.2687	0.1043	0.0328	0.0085	0.0018	0.0003	0.0001	0.0000	0.0000
1.33	0.5714	0.2759	0.1092	0.0351	0.0093	0.0021	0.0004	0.0001	0.0000	0.0000
1.40	0.5833	0.2899	0.1192	0.0400	0.0111	0.0026	0.0005	0.0001	0.0000	0.0000
1.50	0.6000	0.3103	0.1343	0.0480	0.0142	0.0035	0.0008	0.0001	0.0000	0.0000
1.60	0.6154	0.3299	0.1496	0.0565	0.0177	0.0047	0.0011	0.0002	0.0000	0.0000
1.67	0.6250	0.3425	0.1598	0.0624	0.0204	0.0056	0.0013	0.0003	0.0001	0.0000
1.70	0.6296	0.3486	0.1650	0.0655	0.0218	0.0061	0.0015	0.0003	0.0001	0.0000
1.75	0.6364	0.3577	0.1726	0.0702	0.0240	0.0069	0.0017	0.0004	0.0001	0.0000
1.80	0.6429	0.3665	0.1803	0.0750	0.0263	0.0078	0.0020	0.0005	0.0001	0.0000
1.90	0.6552	0.3836	0.1955	0.0850	0.0313	0.0098	0.0027	0.0006	0.0001	0.0000
2.00	0.6667	0.4000	0.2105	0.0952	0.0367	0.0121	0.0034	0.0009	0.0002	0.0000
2.10	0.6774	0.4156	0.2254	0.1058	0.0425	0.0147	0.0044	0.0011	0.0003	0.0001
2.20	0.6875	0.4306	0.2400	0.1166	0.0488	0.0176	0.0055	0.0015	0.0004	0.0001
2.25	0.6923	0.4378	0.2472	0.1221	0.0521	0.0192	0.0061	0.0017	0.0004	0.0001
2.30	0.6970	0.4449	0.2543	0.1276	0.0554	0.0208	0.0068	0.0019	0.0005	0.0001
2.33	0.7000	0.4495	0.2591	0.1313	0.0577	0.0220	0.0073	0.0021	0.0005	0.0001
2.40	0.7059	0.4586	0.2684	0.1387	0.0624	0.0244	0.0083	0.0025	0.0007	0.0002
2.50	0.7143	0.4717	0.2822	0.1499	0.0697	0.0282	0.0100	0.0031	0.0009	0.0002
2.60	0.7222	0.4842	0.2956	0.1612	0.0773	0.0324	0.0119	0.0039	0.0011	0.0003
2.67	0.7273	0.4923	0.3044	0.1687	0.0825	0.0354	0.0133	0.0044	0.0013	0.0003
2.70	0.7297	0.4963	0.3087	0.1725	0.0852	0.0369	0.0140	0.0047	0.0014	0.0004
2.75	0.7333	0.5021	0.3152	0.1781	0.0892	0.0393	0.0152	0.0052	0.0016	0.0004
2.80	0.7368	0.5078	0.3215	0.1837	0.0933	0.0417	0.0164	0.0057	0.0018	0.0005
2.90	0.7436	0.5188	0.3340	0.1949	0.1016	0.0468	0.0190	0.0068	0.0022	0.0006
3.00	0.7500	0.5294	0.3462	0.2061	0.1101	0.0522	0.0219	0.0081	0.0027	0.0008
3.10	0.7561	0.5396	0.3580	0.2172	0.1187	0.0578	0.0249	0.0096	0.0033	0.0010
3.20	0.7619	0.5494	0.3695	0.2281	0.1274	0.0636	0.0283	0.0112	0.0040	0.0013
3.25	0.7647	0.5541	0.3751	0.2336	0.1318	0.0666	0.0300	0.0120	0.0043	0.0014
3.30	0.7674	0.5587	0.3807	0.2390	0.1362	0.0697	0.0318	0.0130	0.0047	0.0016
3.33	0.7692	0.5618	0.3843	0.2426	0.1392	0.0718	0.0331	0.0136	0.0050	0.0017
3.40	0.7727	0.5678	0.3915	0.2497	0.1452	0.0760	0.0356	0.0149	0.0056	0.0019
3.50	0.7778	0.5765	0.4021	0.2603	0.1541	0.0825	0.0396	0.0170	0.0066	0.0023
3.60	0.7826	0.5848	0.4124	0.2707	0.1631	0.0891	0.0438	0.0193	0.0077	0.0028
3.67	0.7857	0.5902	0.4191	0.2775	0.1691	0.0937	0.0468	0.0210	0.0085	0.0031
3.70	0.7872	0.5929	0.4224	0.2809	0.1721	0.0960	0.0483	0.0218	0.0089	0.0033
3.75	0.7895	0.5968	0.4273	0.2860	0.1766	0.0994	0.0506	0.0232	0.0096	0.0036
3.80	0.7917	0.6007	0.4321	0.2910	0.1811	0.1029	0.0529	0.0245	0.0102	0.0039
3.90	0.7959	0.6082	0.4415	0.3009	0.1901	0.1100	0.0577	0.0274	0.0117	0.0046
4.00	0.8000	0.6154	0.4507	0.3107	0.1991	0.1172	0.0627	0.0304	0.0133	0.0053

 $r = p/a$

Erlang Loss Table										
	m									
	1	2	3	4	5	6	7	8	9	10
1	0.5000	0.2000	0.0625	0.0154	0.0031	0.0005	0.0001	0.0000	0.0000	0.0000
1.5	0.6000	0.3103	0.1343	0.0480	0.0142	0.0035	0.0008	0.0001	0.0000	0.0000
2	0.6667	0.4000	0.2105	0.0952	0.0367	0.0121	0.0034	0.0009	0.0002	0.0000
2.5	0.7143	0.4717	0.2822	0.1499	0.0697	0.0282	0.0100	0.0031	0.0009	0.0002
3	0.7500	0.5294	0.3462	0.2061	0.1101	0.0522	0.0219	0.0081	0.0027	0.0008
3.5	0.7778	0.5765	0.4021	0.2603	0.1541	0.0825	0.0396	0.0170	0.0066	0.0023
4	0.8000	0.6154	0.4507	0.3107	0.1991	0.1172	0.0627	0.0304	0.0133	0.0053
4.5	0.8182	0.6480	0.4929	0.3567	0.2430	0.1542	0.0902	0.0483	0.0236	0.0105
5	0.8333	0.6757	0.5297	0.3983	0.2849	0.1918	0.1205	0.0700	0.0375	0.0184
5.5	0.8462	0.6994	0.5618	0.4358	0.3241	0.2290	0.1525	0.0949	0.0548	0.0293
6	0.8571	0.7200	0.5902	0.4696	0.3604	0.2649	0.1851	0.1219	0.0751	0.0431
6.5	0.8667	0.7380	0.6152	0.4999	0.3939	0.2991	0.2174	0.1501	0.0978	0.0598
7	0.8750	0.7538	0.6375	0.5273	0.4247	0.3313	0.2489	0.1788	0.1221	0.0787
7.5	0.8824	0.7679	0.6575	0.5521	0.4530	0.3615	0.2792	0.2075	0.1474	0.0995
8	0.8889	0.7805	0.6755	0.5746	0.4790	0.3898	0.3082	0.2356	0.1731	0.1217
8.5	0.8947	0.7918	0.6917	0.5951	0.5029	0.4160	0.3356	0.2629	0.1989	0.1446
9	0.9000	0.8020	0.7064	0.6138	0.5249	0.4405	0.3616	0.2892	0.2243	0.1680
9.5	0.9048	0.8112	0.7198	0.6309	0.5452	0.4633	0.3860	0.3143	0.2491	0.1914
10	0.9091	0.8197	0.7321	0.6467	0.5640	0.4845	0.4090	0.3383	0.2732	0.2146
10.5	0.9130	0.8274	0.7433	0.6612	0.5813	0.5043	0.4307	0.3611	0.2964	0.2374
11	0.9167	0.8345	0.7537	0.6745	0.5974	0.5227	0.4510	0.3828	0.3187	0.2596
11.5	0.9200	0.8410	0.7633	0.6869	0.6124	0.5400	0.4701	0.4033	0.3400	0.2811
12	0.9231	0.8471	0.7721	0.6985	0.6264	0.5561	0.4880	0.4227	0.3604	0.3019
12.5	0.9259	0.8527	0.7804	0.7092	0.6394	0.5712	0.5049	0.4410	0.3799	0.3220
13	0.9286	0.8579	0.7880	0.7192	0.6516	0.5854	0.5209	0.4584	0.3984	0.3412
13.5	0.9310	0.8627	0.7952	0.7285	0.6630	0.5987	0.5359	0.4749	0.4160	0.3596
14	0.9333	0.8673	0.8019	0.7373	0.6737	0.6112	0.5500	0.4905	0.4328	0.3773
14.5	0.9355	0.8715	0.8081	0.7455	0.6837	0.6230	0.5634	0.5052	0.4487	0.3942
15	0.9375	0.8755	0.8140	0.7532	0.6932	0.6341	0.5761	0.5193	0.4639	0.4103
15.5	0.9394	0.8792	0.8196	0.7605	0.7022	0.6446	0.5880	0.5326	0.4784	0.4258
16	0.9412	0.8828	0.8248	0.7674	0.7106	0.6546	0.5994	0.5452	0.4922	0.4406
16.5	0.9429	0.8861	0.8297	0.7739	0.7186	0.6640	0.6102	0.5572	0.5053	0.4547
17	0.9444	0.8892	0.8344	0.7800	0.7262	0.6729	0.6204	0.5687	0.5179	0.4682
17.5	0.9459	0.8922	0.8388	0.7859	0.7334	0.6814	0.6301	0.5795	0.5298	0.4811
18	0.9474	0.8950	0.8430	0.7914	0.7402	0.6895	0.6394	0.5899	0.5413	0.4935
18.5	0.9487	0.8977	0.8470	0.7966	0.7467	0.6972	0.6482	0.5998	0.5522	0.5053
19	0.9500	0.9002	0.8508	0.8016	0.7529	0.7045	0.6566	0.6093	0.5626	0.5167
19.5	0.9512	0.9027	0.8544	0.8064	0.7587	0.7115	0.6647	0.6183	0.5726	0.5275
20	0.9524	0.9050	0.8578	0.8109	0.7644	0.7181	0.6723	0.6270	0.5822	0.5380
20.5	0.9535	0.9072	0.8611	0.8153	0.7697	0.7245	0.6797	0.6353	0.5913	0.5480
21	0.9545	0.9093	0.8642	0.8194	0.7749	0.7306	0.6867	0.6432	0.6001	0.5576
21.5	0.9556	0.9113	0.8672	0.8234	0.7798	0.7364	0.6934	0.6508	0.6086	0.5668
22	0.9565	0.9132	0.8701	0.8272	0.7845	0.7420	0.6999	0.6581	0.6167	0.5757
22.5	0.9574	0.9150	0.8728	0.8308	0.7890	0.7474	0.7061	0.6651	0.6244	0.5842
23	0.9583	0.9168	0.8754	0.8343	0.7933	0.7525	0.7120	0.6718	0.6319	0.5924
23.5	0.9592	0.9185	0.8780	0.8376	0.7974	0.7575	0.7177	0.6783	0.6391	0.6003
24	0.9600	0.9201	0.8804	0.8408	0.8014	0.7622	0.7232	0.6845	0.6461	0.6079
24.5	0.9608	0.9217	0.8827	0.8439	0.8053	0.7668	0.7285	0.6905	0.6527	0.6153
25	0.9615	0.9232	0.8850	0.8469	0.8090	0.7712	0.7336	0.6963	0.6592	0.6224
25.5	0.9623	0.9246	0.8871	0.8497	0.8125	0.7754	0.7385	0.7019	0.6654	0.6292
26	0.9630	0.9260	0.8892	0.8525	0.8159	0.7795	0.7433	0.7072	0.6714	0.6358
26.5	0.9636	0.9274	0.8912	0.8552	0.8192	0.7835	0.7479	0.7124	0.6772	0.6422
27	0.9643	0.9287	0.8931	0.8577	0.8224	0.7873	0.7523	0.7174	0.6828	0.6483
27.5	0.9649	0.9299	0.8950	0.8602	0.8255	0.7910	0.7565	0.7223	0.6882	0.6543
28	0.9655	0.9311	0.8968	0.8626	0.8285	0.7945	0.7607	0.7269	0.6934	0.6600
28.5	0.9661	0.9323	0.8985	0.8649	0.8314	0.7979	0.7646	0.7315	0.6985	0.6656
29	0.9667	0.9334	0.9002	0.8671	0.8341	0.8013	0.7685	0.7359	0.7034	0.6710
29.5	0.9672	0.9345	0.9019	0.8693	0.8368	0.8045	0.7722	0.7401	0.7081	0.6763
30	0.9677	0.9356	0.9034	0.8714	0.8394	0.8076	0.7758	0.7442	0.7127	0.6813
30.5	0.9683	0.9366	0.9050	0.8734	0.8420	0.8106	0.7793	0.7482	0.7172	0.6863
31	0.9688	0.9376	0.9064	0.8754	0.8444	0.8135	0.7827	0.7521	0.7215	0.6910
31.5	0.9692	0.9385	0.9079	0.8773	0.8468	0.8164	0.7860	0.7558	0.7257	0.6957
32	0.9697	0.9394	0.9093	0.8791	0.8491	0.8191	0.7892	0.7594	0.7297	0.7002

 $r = p/i$

Final Exam Answers OPIM611

PART A

Mr. K's Hair Salon

1. S1 can process 1/10 customers per minute.
S2 can process 1/20 customers per minute.
S3 can process 1/30 customers per minute.
S3 has the lowest capacity and is hence the bottleneck.
2. Since we assume that there is unlimited demand, the flow rate is equal to the capacity of the process, i.e., 2 customers per hour.
The capacity of S2 is 3 customers per hour.
The utilization at S2 is $2/3 = 66.7\%$.
3. labor content = $10+20+30 = 60$ min.
total idle time = $20+10 = 30$ min.
Average labor utilization = $60/(60+30) = 2/3 = 66.7\%$
4. Direct labor costs = (Total wages) / (flow rate)
There are three employees with a wage of \$18/hr implying that the total wages per hour are given by $18 \times 3 = \$54/\text{hr}$.
We deduce that direct labor costs = $54/2 = \$27$
5. What would be the costs of direct labor of serving one guest under each of the two alternatives? Assume that the system operates at its capacity.

Under Alternative I, the additional worker would help S3 and under this case the bottleneck would become S2 with a capacity of 3 customers/hr.

Direct labor costs = $(18 \times 4)/3 = \$24$

Under Alternative II, S3 would still be the bottleneck but the new capacity of S3 will be of $60/25 = 2.4$ customers/hr.

Direct labor costs = $(18 \times 3)/2.4 = \$22.5$

PART B

Penne Pesto

1. The service time per customer is given by $50+10 = 60$ minutes = 1hr.
Hence, the number of guests served per hour (using Little's Law) is given by 50 customers.
In an evening (4 hours), the number of guests served will be 200.

2. $ROIC = \text{Return}/(\text{Invested Capital}) = (\text{Return}/\text{Sales}) \times (\text{Sales}/\text{Invested Capital})$

Sales (per evening) = $200 \times 20 = \$4000$

Sales (per year) = $4000 \times 365 = 1,460,000$

Return = Sales – [(labor costs) + (material costs) + rent + overhead]
 $= 4000 - [20 \times 90 + 200 \times 5.50 + 500 + 00]$
 $= 4000 - [1800 + 1100 + 500 + 500]$
 $= 100$

Invested Capital = 200,000

Sales (per year) = $4000 \times 365 = 1,460,000$

Plugging in,

ROIC = $0.025 \times 7.3 = 18.25\%$

3. The service time per guest decreases to $50 + 5 = 55$ minutes.
 The flow rate is now $60 \times 50 / 55 = 54.54$ customers/hour, which implies that we serve $54.54 \times 4 = 218$ guests in one evening.

The Sales per evening are now $218 \times 20 = \$4363$

The material costs are now $218 \times 5.5 = \$1199$

Plugging in the formula for the ROIC, one obtains

ROIC = 66%

4. What would be the new ROIC if over-head charges could be reduced by \$100 per day? Answer this question independent of the previous question.

Going back to PP2., The return is now

Return = $4000 - [20 \times 90 + 200 \times 5.50 + 500 + 400]$
 $= 200$

ROIC = $(200/4000) \times 7.3 = 36.5\%$

PART C

ProofSmart Inc.

1. d. **\$66,000,000**

2006 COGS = $2,367,121 \times 11 = \$26,038,331$

2006 Sales = $26,038,331 / (1 - 42\%) = \$44,893,674$

2007 Sales = $44,893,674 \times 148\% = \$66,442,638$

2. f. **15**

2007 COGS = $66,442,638 \times (1 - 45\%) = \$36,543,451$

2007 Inventory Turns = $36,543,451 / 2,418,257 = 15$

PART D**Toyota and Capital One Cases**

1. **g. None of the above**
2. **d. IV only**
3. **c. Underwriting**

PART E**The right to vote (and not to wait)**

1. **e. 71 minutes**

$m=1$;
 average activity time: $p = 1.71$ min.
 average inter-arrival time: $a = 60/35 = 1.67$ min.
 utilization = $p/(a*m) = 0.97$
 $CV_a = 1$
 $CV_p = 1.2$
 $T_q = 71.7$ minutes

2. **a. 1 minute**

$m=2$;
 average activity time: $p = 1.71$ min.
 average inter-arrival time: $a = 60/35 = 1.67$ min.
 utilization = $p/(a*m) = 0.49$
 $CV_a = 1$
 $CV_p = 1.2$
 $T_q = 0.7$ minutes

3. **c. 2.4**

$I_p = m*u = 0.97$
 $I_q = T_q/a = 0.41$
 $I_p/I_q = 0.97/0.41 = 2.39$

4. **c. Between 150 and 250**

This is a loss system with $m=1$ $r=p/a = 0.97$. Going to the Erlang table, one finds that the probability of a voter finding the server busy is approximately $P_m = 0.5$.

The number of people voting is equal to half of those showing up at the voting station, i.e., given by $0.5*35*12=210$.

PART F**Airport Massage Station****1. f. 12**

$$m=4$$

$$p = 15 \text{ minutes}$$

$$a = 60/20 = 3 \text{ minutes}$$

$$r = p/a = 15/4 = 5$$

$$P_m = 0.3983$$

$$\text{Average number of customers serviced per hour} = 20 \cdot (1 - P_m) = 12.034$$

2. c. 2 additional employees

$$\text{With no hire, the profit rate [$/hr] is } 30 \cdot 20 \cdot (1 - P_m) - 4 \cdot 50 = 161$$

If one adds one employee: $m=5$, $P_m = 0.2849$, and the profit can be compute as before and is given by 179

If one adds two employees: $m=6$, $P_m = 0.1918$, and the profit can be compute as before and is given by 185

If one adds three employees: $m=7$, $P_m = 0.1205$, and the profit can be compute as before and is given by 178

The profit rate is maximized when hiring two additional employees.

PART G**Old City Photographics****1. a. The process is demand-constrained**

Implied utilization is:

$$(100\% \cdot 13 \text{ jobs/hr} \cdot 2\text{min/job}) / (60\text{min/hr}) = 0.43 \text{ at "process film"}$$

$$((37\%+19\%) \cdot 13 \text{ jobs/hr} \cdot 5\text{min/job}) / (60\text{min/hr}) = 0.61 \text{ at "scan film"}$$

$$((44\%+37\%) \cdot 13 \text{ jobs/hr} \cdot 4\text{min/job}) / (60\text{min/hr}) = 0.70 \text{ at "make 6"x4" prints"}$$

$$(19\% \cdot 13 \text{ jobs/hr} \cdot 10\text{min/job}) / (60\text{min/hr}) = 0.41 \text{ at "make contact print"}$$

As implied utilization is less than 1.0 at all steps, the process is demand-constrained.

2. c. 60% to 70%**3. i. 18**

From the calculations for OCP1, we know that "make 6"x4" prints" will become the bottleneck once the process is capacity-constrained (if the mix of jobs does not change). The answer to our present question is thus given by the solution X to the equation

$$((44\%+37\%) \cdot X \text{ jobs/hr} \cdot 4\text{min/job}) / (60\text{min/hr}) = 1.00.$$

Re-arranging the equation yields

$$X = (60\text{min/hr}) / (81\% \cdot 4\text{min/job}) = 18.5 \text{ jobs/hr.}$$

PART H**TaxInc****1. b. 10 minutes**

Arrival rate at Agent 1: $R_1 = 30$ customers/ hour

Average Inventory in buffer in front of Agent 1: $I_1 = 5$

Use Little's Law to get

Average time spent waiting in front of Agent 1:

$$T_1 = I_1 / R_1 = 5 / 30 = 1/6 \text{ hr} = 10 \text{ minutes}$$

2. d. 28 minutes

We already know the time spent waiting for Agent 1, $T_1 = 10$ minutes.

Let us compute the time spent waiting in front of Agent 2 after having spoken to Agent 1.

Arrival rate at Agent 2: $R_2 = 30 \times 1/3 = 10$ customers/ hour

Average Inventory in buffer in front of Agent 2: $I_2 = 3$

Use Little's Law to get

Average time spent waiting in front of Agent 2:

$$T_2 = I_2 / R_2 = 3 / 10 = 0.3 \text{ hr} = 18 \text{ minutes}$$

Average total time spent waiting = $T_1 + T_2 = 28$ minutes.

PART I**Kick Scooters****1. a. Stamping**

The capacity at stamping is $120 / (90 + 120 \times 0.5 + 90 + 240 \times 0.5) \times 60 = 20$ units per hour. The capacity at assembly is $1 / 30 \times 12 \times 60 = 24$ units per hour. Therefore, stamping is the bottleneck.

2. d. 20 units/hour

Since stamping is the bottleneck, its capacity is also the process capacity.

3. a. increase the batch size at the Stamping step

At a batch-producing step, increasing the batch size increases the capacity at the step.

4. c. 180 sets

At a batch size of 180, the capacity at stamping is:

$$180 / (90 + 180 \times 0.5 + 90 + 360 \times 0.5) \times 60 = 24 \text{ units per hour.}$$

Regression Analysis for Business (STAT613)

SAMPLE EXAM

■ Instructions

Read these instructions carefully.

Questions 1-20 of this exam are used to place into STAT621.

Questions 1-43 are used to waive STAT completely.

This is a **closed-book** exam. You are allowed to use a calculator and one page (8.5 by 11 inches or A4, both sides) of **handwritten** notes. No use of cellular telephones or other portable electronics is permitted.

You have **two hours** for the exam. There are **43** questions. The **computer output** associated with one or more questions should be considered an essential part of the questions. The multiple-choice questions are **equally weighted**; the number of correct answers determines your grade.

Throughout this exam, the word “significant” implies “statistically significant” and by “sample” we mean a simple random sample. Use 95% confidence intervals and a p -value threshold of 0.05 to determine statistical significance unless otherwise instructed. All logarithms are natural logs (that is, $\ln$ or $\log_e$) unless otherwise noted.

All categorical predictor variables have been coded according to a dummy variable coding scheme with the reference category being the level of the variable that is last, using an alphanumeric sort.

Please note the following when filling in the answer form:

- Mark the answer form only using a **pencil**. Erase changes completely.
- **Fill in your name and student id number** on the answer form.
- **Mark the “bubbles”** under your name and student id number.
- Choose the **one best** answer by marking the item on the answer form.

When you have completed the exam, turn in the answer form and your exam with your name on it. Solutions will be posted in Canvas.

■ STOP

Do NOT turn the page until you are instructed to proceed.

1. The amount spent by a customer is normally distributed with mean $\mu = \$300$ and $\sigma = \$50$. The probability that a randomly selected customer spends less than \$200 is approximately
 - a. 0.167
 - b. 0.334
 - c. 0.050
 - d. 0.025
 - e. 0.010

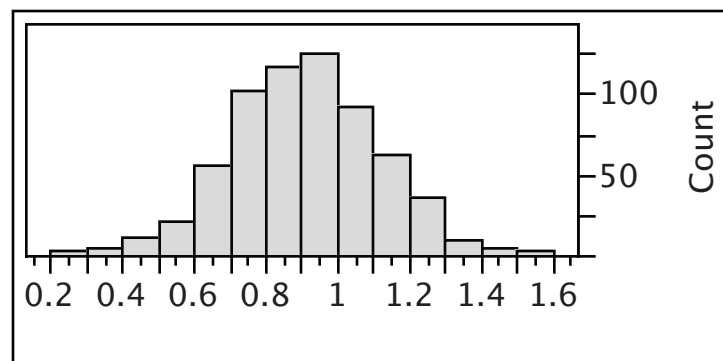
2. You toss a fair coin repeatedly. Of the following, which has the highest probability of getting exactly 50% heads.
 - a. Toss it once
 - b. Toss it 10 times
 - c. Toss it 100 times
 - d. Toss it 1000 times.
 - e. Toss it 1,000,000 times.

3. The IQs of a large population is Normally distributed with a mean of 100 and an SD of 15 points. Suppose you randomly choose 40 people from the population. What is the approximate chance that you get at least one person with an IQ of 130 or higher?
 - a. .025
 - b. .33
 - c. .36
 - d. .5
 - e. .64

4. The standard deviation in a population of incomes is $\sigma = \$20,000$. To obtain a 95% confidence interval for μ with total width (width = upper endpoint – lower endpoint) less than \$500 requires a sample size of about
 - a. 5,000
 - b. 100
 - c. 50
 - d. 2,000
 - e. More than 25,000

5. The standard error of the mean
- Estimates the SD of the population.
 - Increases with the size of a sample.
 - Measures the sample-to-sample standard deviation of sample means.
 - Determines the sample size needed in order to apply the central limit theorem.
 - Is the expected size of the deviation of $\bar{x}$ -bar from μ .

QUESTIONS 6–7



6. Consider the histogram shown immediately above this question. Based on this histogram, it is evident that
- The population mean $\mu \leq 0$.
 - The sample size is less than 200.
 - The 95% confidence interval for the mean includes 0.
 - The sample is too small to produce a normally distributed sampling distribution.
 - The sample mean is about the same as the sample median.
7. Refer again to the histogram shown before Question 6. The standard deviation of these data is approximately
- 0.01
 - 0.2
 - 2.0
 - 0.05
 - 1.0

QUESTIONS 8–10

A retail web site gathered data about customers who bought either a camera or a phone (but not both). Within this population, 40% of the customers bought a camera. Of those customers who bought cameras, 25% reported incomes less than \$50,000. Among those who bought a mobile phone, 50% reported incomes less than \$50,000.

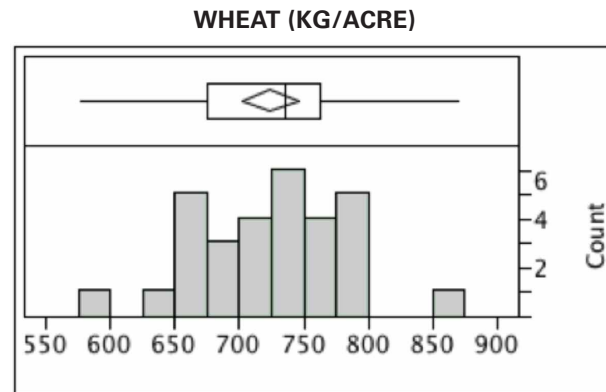
- 8.** These results show that the proportion of this population of customers who have incomes of at least \$50,000 is
 - a.** 0.50
 - b.** 0.40
 - c.** 0.25
 - d.** 0.60
 - e.** 0.35

- 9.** The web site profits \$10 for each camera and \$5 for each mobile phone sold. The expected value of the profit produced by the purchase choice of a randomly selected customer from this population is
 - a.** \$5
 - b.** \$8
 - c.** \$6
 - d.** \$7
 - e.** \$9

- 10.** The probability that a randomly chosen customer from this population who has income above \$50,000 buys a phone is
 - a.** 0.25
 - b.** 0.40
 - c.** 0.50
 - d.** 0.60
 - e.** 0.35

QUESTIONS 11–16

An agricultural corporation grows wheat on 10,000 acres. To estimate the total harvest, the corporation measures the yield (in kilograms per acre, kg/acre) just prior to harvest on a sample of 30 one-acre, non-overlapping tracts randomly located over this land.



100.0%	maximum	870	Mean	724.133
75.0%	quartile	763	Std Dev	60.146
50.0%	median	741		
25.0%	quartile	675	N	30
0.0%	minimum	576		

- 11.** These data imply that the probability of observing a tract selected at random from this population with yield less than 741 kg/acres is
- About 25%.
 - About 50%.
 - About 50%, provided the population is normally distributed.
 - About 95%.
 - Less than 50%.
- 12.** Had the corporation gathered a larger sample of 100 tracts, then we should expect to find
- Smaller average yield.
 - Larger average yield.
 - Smaller standard deviation.
 - Smaller maximum yield.
 - Smaller standard error of the mean.

- 13.** Sales agreements were designed under the expectation that the average yield this corporation would produce is 750 kg/acre when fully harvested. Assuming the appropriate conditions are met, this analysis indicates that the average yield will be
- a.** Statistically significantly less than expected.
 - b.** Less than expected, but not significantly.
 - c.** More than expected, but not significantly.
 - d.** Statistically significantly more than expected.
 - e.** Within 1% of the amount planners expected.
- 14.** Do these data satisfy the conditions of a one-sample confidence interval for the mean?
- a.** Yes.
 - b.** No, the sample size $n = 30$ is too small.
 - c.** No, the data are not normally distributed.
 - d.** No, the data were not sampled with replacement.
 - e.** No, outlying yields have produced an unreliable estimated standard deviation.
- 15.** When the full 10,000 acres is harvested, this analysis (assuming the usual conditions are met and with 95% confidence) can be expected to provide
- a.** Between 7,020,000 to 7,460,000 kg wheat.
 - b.** The sample does not produce an estimate of the total yield.
 - c.** Between 5,760,000 to 8,700,000 kg wheat
 - d.** Between 6,750,000 to 7,630,000 kg wheat
 - e.** Between 6,040,000 to 8,440,000 kg wheat
- 16.** Prior to this season, the firm from which the corporation purchased seeds promised that this variety would produce on average more than 700 kg wheat per acre. Assuming the necessary conditions are met, a statistical test of the null hypothesis $H_0: \mu \leq 700$ kg/acre has p -value
- a.** About 1/6
 - b.** About 1/3
 - c.** Less than 0.05
 - d.** About 1/2
 - e.** Larger than 1/2

QUESTIONS 17–20

The Transportation Department (TDP) is concerned about over-weight trucks damaging highways. TDP maintains that no more than 10% of trucks on the roads are over-weight and has publically indicated that the percentage is less. As a precaution, TDP plans to weigh a sample of trucks operating on major routes. Unless the data reject its beliefs, TDP will continue normal operations. If the data reject its beliefs, TDP will institute reforms. Let p denote the population proportion of overweight trucks operating on roads.

17. The appropriate null hypothesis for TDP to test is
 - a. $H_0: p \leq 0.10$
 - b. $H_0: \text{sample proportion} \leq 0.10$
 - c. $H_0: p = 0.10$
 - d. $H_0: p = 0.50$
 - e. $H_0: p \geq 0.10$

18. TDP plans to estimate p by the sample proportion of overweight trucks from a random sample of size $n = 100$. If in the population, $p = 0.10$ then the probability that more than 20% of the trucks in a sample are overweight
 - a. Is about 0.13.
 - b. Is less than 0.05.
 - c. Is about 0.37.
 - d. Cannot be determined without further information.
 - e. Is more than 0.84.

19. A critic of TDP gathered a sample of $n = 400$ trucks and used these to test $H_0: p \leq 0.09$ with $n = 400$. In her random sample, the sample proportion of overweight trucks was 0.10 (10%). She should conclude that
 - a. She needs a larger sample to test H_0 .
 - b. She should reject H_0 .
 - c. She cannot reject H_0 .
 - d. She should change H_0 to match the data, revising it to $H_0: p \leq 0.10$.
 - e. The data do not meet the conditions for using a one-sample t -test.

- 20.** An analyst dislikes hypothesis testing and produced a 95% confidence interval from an independent sample of data, with the interval found to be 0.093 to 0.157. Based on this confidence interval (assuming the usual conditions), the analyst should
- Reject $H_0: p = 0.10$.
 - Reject $H_0: p \neq 0.10$.
 - Use a 90% confidence interval instead.
 - Gather more data until the confidence interval omits 0.10.
 - Not reject $H_0: p = 0.10$.

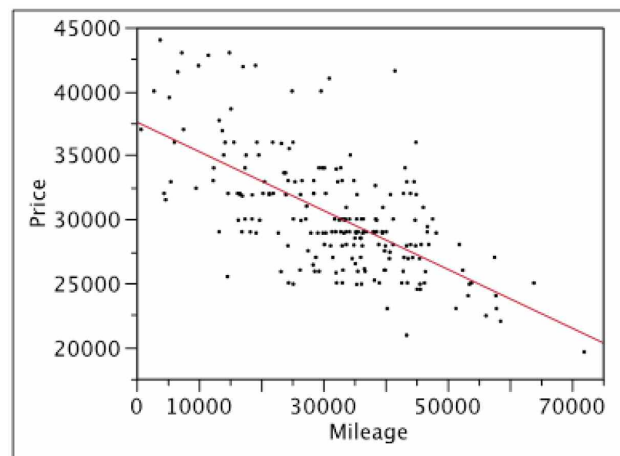
Only answer the rest of the questions if you wish to waive STAT completely.

- 21.** Which of the following summaries from a fitted regression best measures the degree of collinearity associated with an estimated coefficient?
- R^2 .
 - RMSE.
 - The VIF for the coefficient.
 - The standard error of the slope.
 - The 95% confidence band for the true regression line.
- 22.** If the variances of the error terms in a simple regression increase with increasing values of the explanatory variable X and one incorrectly assumes the SRM, then the
- Estimated slope will be too steep.
 - Estimated intercept will be too close to zero.
 - Explanatory variable should be re-expressed on a log scale.
 - Residuals from the fit will appear to be autocorrelated.
 - Prediction intervals for small values of X will be too wide.
- 23.** When building a regression model with a categorical explanatory variable, a common diagnostic plot shows side-by-side comparison boxplots of the model residuals grouped by the levels of the categorical variable. This plot is most useful to
- Check the assumption of independence.
 - Check assumption of equal variance.
 - Check the assumption of normality.
 - Identify the presence of leveraged outliers.
 - Determine the statistical significance of the categorical variable.

- 24.** Regression models assume that some of the variability in the response is due to random sources not identified in the model's equation. The estimated standard deviation of this unexplained variation is known as
- RMSE.
 - Standard error of Y .
 - Standard error of X .
 - R^2 .
 - F - ratio.
- 25.** If the variable X_2 is added to a simple regression that includes X_1 , then which of the following must happen in the multiple regression if X_1 and X_2 are uncorrelated?
- RMSE must get smaller.
 - The partial regression coefficient for X_2 will be smaller than that for X_1 .
 - The overall ANOVA F -statistic will have a larger p -value.
 - The partial regression coefficient for X_1 will be the same as the marginal coefficient.
 - The overall ANOVA F -statistic will have a smaller p -value.

QUESTIONS 26–31

The data shown in the following scatterplot and simple regression report the price and the number of miles driven for 218 used cars (all in the BMW 325 series) offered for sale in the San Francisco area.



$$\text{PRICE (\$)} = 37650 - 0.24 \text{ MILEAGE}$$

RSquare	0.42
Root Mean Square Error	3500
Mean of Response	30269
Observations	218

- 26.** According to the fitted equation, a car like these with 40,000 miles would be expected to cost on average
- a.** \$37,650.
 - b.** \$30,450.
 - c.** \$28,050.
 - d.** \$36,690.
 - e.** \$25, 050.
- 27.** A used car with 40,000 miles is offered for sale at a price that is \$3,500 above the prediction from this model. Given that the assumptions of the SRM hold, then this car's price is
- a.** Larger than about 50% of cars with 40,000 miles.
 - b.** Larger than about 95% of cars with 40,000 miles.
 - c.** Larger than about 5% of cars with 40,000 miles.
 - d.** Larger than about 84% of cars with 40,000 miles.
 - e.** Larger than about 67% of cars with 40,000 miles.
- 28.** The equation of the fitted model implies that on average for cars such as these, an additional 1,000 miles of driving
- a.** Has no effect on the expected price of the used car.
 - b.** Increases the expected price by about \$240.
 - c.** Decreases the expected price by about \$240.
 - d.** Increases the expected price by about 24 percent.
 - e.** Decreases the expected price by about 240 percent.
- 29.** An economist claims that the elasticity of price with respect to mileage driven is constant. How would you adapt this model to estimate the elasticity?
- a.** The model does not need to be changed.
 - b.** Take the log of price but not mileage.
 - c.** Take the log of mileage but not price.
 - d.** Add a quadratic term to the model to create a power function.
 - e.** Regress the log of price against the log of mileage.

- 30.** To obtain a more precise estimate of the slope in this model, we should (assuming the assumptions of the SRM hold)
- a.** Remove the outlying expensive cars with prices above \$40,000.
 - b.** Remove all of the cars with mileage above 50,000.
 - c.** Add prices for 10 more cars which have the average mileage $\bar{x} = 32,000$ miles.
 - d.** Add prices for 10 low-mileage cars.
 - e.** Add prices for 5 low-mileage cars and 5 cars with 50,000 to 60,000 miles.
- 31.** If an additional variable, the age of the car, were added to the regression, then which of the following would you expect to happen.
- a.** Severe autocorrelation would be introduced.
 - b.** Collinearity would be eliminated.
 - c.** R-squared would decrease.
 - d.** The estimated regression coefficient for mileage would be closer to zero.
 - e.** The standard deviation of the residuals would increase.

QUESTIONS 32–43

A banking analyst was interested in predicting the yield on a ten-year bond for a new issue from a company in one of two South East Asian countries (Malaysia or Singapore). The analyst collected data on 85 previous bond issues from different companies in the region. Output on the next page shows a model that includes a country effect, the annual revenue of the bond-issuing company in millions of \$US in the previous year and a measure of the financial leverage of the company (calculated as the ratio of total liabilities to net worth). Note that the variable “Financial Leverage” has nothing to do whatsoever with the concept of statistical leverage.

SUMMARY OF FIT

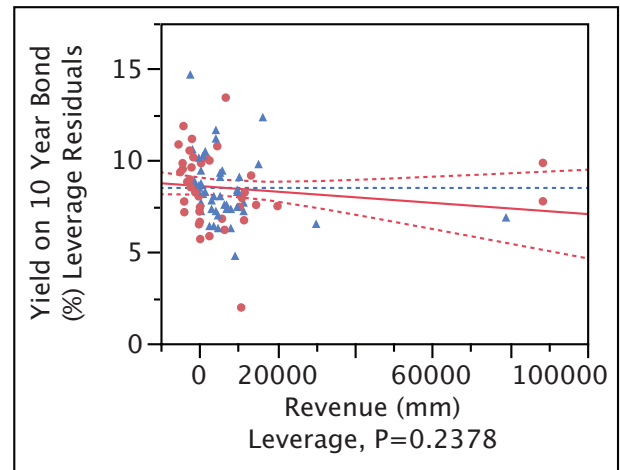
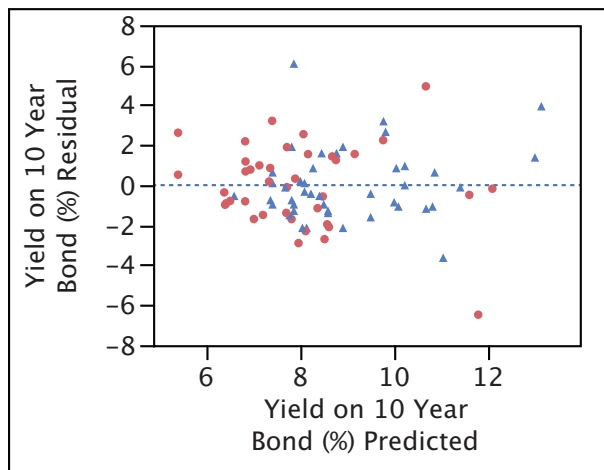
RSquare	0.407634
Root Mean Square Error	1.931565
Mean of Response	8.490706
Observations (or Sum Wgts)	85

ANALYSIS OF VARIANCE

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	207.96174	69.3206	18.5799
Error	81	302.20642	3.7309	Prob > F
C. Total	84	510.16816		<.0001*

INDICATOR FUNCTION PARAMETERIZATION

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	6.4595152	0.434899	14.85	<.0001*
Revenue (mm)	-1.531e-5	1.287e-5	-1.19	0.2378
Financial Leverage	0.7118301	0.11191	6.36	<.0001*
country[Malaysia]	1.0083861	0.423381	2.38	0.0196*



- 32.** The estimated yield on a bond based on the fitted model for a Singaporean company with revenues of \$25 (mm) and a Financial Leverage of 2 is approximately
- a.** 15.4
 - b.** 40.6
 - c.** 7.9
 - d.** 7.5
 - e.** 8.5
- 33.** If we remove the variable Financial Leverage from this multiple regression, then (given the assumptions of the Multiple Regression Model [MRM] hold)
- a.** The value of R^2 would increase by a significant amount.
 - b.** The value of R^2 would increase.
 - c.** The value of R^2 would decrease.
 - d.** The value of R^2 would decrease by a significant amount.
 - e.** The change in the value of R^2 cannot be determined.
- 34.** A bond from a company with \$20 (mm) revenue and Financial Leverage of 3 is issued. In which country would it be expected to have the lower yield?
- a.** Singapore.
 - b.** Malaysia.
 - c.** The model predicts the same yield in both countries.
 - d.** There is no information available in the model to answer this question.
 - e.** This question cannot be answered without an interaction in the model.
- 35.** If a company in Singapore were to increase its Financial Leverage by 1, keeping revenues constant, this model implies that the yield would be expected to
- a.** Decrease on average by between (0.488, 0.936) with 95% confidence
 - b.** Decrease on average by between (-3.15, 4.58) with 95% confidence.
 - c.** Increase on average by between (0.488, 0.936) with 95% confidence.
 - d.** Increase on average by between (-3.15, 4.58) with 95% confidence
 - e.** Decrease on average by between (0.598, 0.825) with 95% confidence

- 36.** The fitted regression model includes a positive estimated coefficient for Financial Leverage. The best interpretation of this coefficient is that
- a.** If this variable were removed from the model, then R-squared would increase but not by a significant amount.
 - b.** Within a specific country and for those with identical Financial Leverages but different Revenues, companies are expected to have identical yields.
 - c.** Within a specific country and for those with identical Revenues, companies with greater Financial Leverage are expected to have higher yields, but the difference is not significant.
 - d.** Within a specific country and for those with identical Revenues, companies with greater Financial Leverage are expected to have higher yields and the difference is significant.
 - e.** Companies with more leverage have higher yields.
- 37.** If the analysts had measured Revenues in Japanese Yen rather than dollars and rerun the above model then which of the following regression summaries would change in value?
- a.** R^2 .
 - b.** Standard error of the estimated Revenue slope.
 - c.** t-statistic for the Revenue slope.
 - d.** RMSE.
 - e.** Overall Anova F-ratio.
- 38.** With reference to the leverage plot for Revenue, which of the following is a reasonable conclusion?
- a.** There is severe collinearity in this dataset.
 - b.** Autocorrelation is likely.
 - c.** There are no leveraged outliers in the dataset.
 - d.** Leveraged observations produce a significant effect for Revenue in the model.
 - e.** Leveraged observations reduce the standard error of Revenue in the model.

Output below on this page comes from a model that drops three outliers in Revenue and adds an interaction between Financial Leverage and the variable Country.

SUMMARY OF FIT

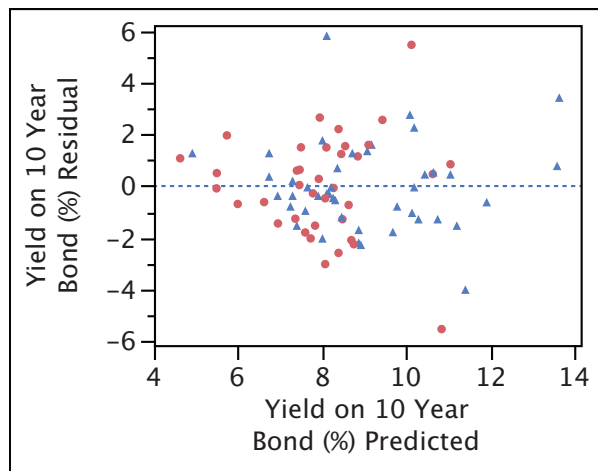
RSquare	0.465887
Root Mean Square Error	1.856047
Mean of Response	8.558659
Observations (or Sum Wgts)	82

ANALYSIS OF VARIANCE

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	231.37523	57.8438	16.7911
Error	77	265.25812	3.4449	Prob > F
C. Total	81	496.63335		<.0001*

INDICATOR FUNCTION PARAMETERIZATION

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	7.3640367	0.545934	13.49	<.0001*
Revenue (mm)	-0.000115	3.748e-5	-3.08	0.0029*
Financial Leverage	0.469127	0.161105	2.91	0.0047*
Country[Malaysia]	0.3603138	0.640399	0.56	0.5753
Financial Leverage*country[Malaysia]	0.2875725	0.210909	1.36	0.1767



39. Which of the following features is the new model (that excludes the three leveraged points and adds an interaction) able to address that the original model (shown on page 171) could not?
- That the slope for Revenue depends on the county.
 - That yields in Singapore are lower than in Malaysia.
 - A differential impact of Financial Leverage on yields across countries.
 - Autocorrelation of the residuals due to the time series nature of the data.
 - Collinearity between Revenue and Financial Leverage.

- 40.** Comparing the new model (that excludes the three leveraged points and adds an interaction) to the original model, a fair interpretation of the results is that
- a.** The interaction term adds significant explanatory power to the model.
 - b.** The interaction term removes collinearity from the model.
 - c.** The Country term should be removed from the model since not significant.
 - d.** The removal of the three outliers reveals the importance of Revenue.
 - e.** The removal of the three outliers improperly inflates R^2 .
- 41.** Assuming the MRM holds, what does the p-value for Revenue in the interaction model tell you?
- a.** The Revenue variable should be removed from the model.
 - b.** The probability that the true Revenue partial slope is one is less than 0.0001.
 - c.** If the true Revenue partial slope were equal to zero, then it is extremely unlikely that we would have observed an estimate so far from zero.
 - d.** That the confidence interval for the partial slope of Revenue contains zero.
 - e.** The addition of Revenue to a model containing the others adds little to R^2 .
- 42.** Based on the new fitted model above with the interaction term, the estimated yield on a bond for a Singaporean company with revenues of \$25 (mm) and a Financial Leverage of 2 is approximately
- a.** 8.3
 - b.** 8.9
 - c.** 8.6
 - d.** 9.2
 - e.** 0.93
- 43.** If a company with the characteristics presented in the prior question (#42) issued a bond and its yield was less than 0.5 below the predicted yield, then based on the fitted interaction model would you be surprised?
- a.** No, as this event is almost certain to happen.
 - b.** No, as this event lies within the statistical uncertainty of the model.
 - c.** No, as the high value of R^2 makes this likely with 95% confidence.
 - d.** Yes, because the large sample size makes this unlikely.
 - e.** Yes, as this yield is more than twice the RMSE from the fitted value.

Sample Exam Answers STAT613

- | | |
|--------|--------|
| 1. d. | 23. b. |
| 2. b. | 24. a. |
| 3. e. | 25. d. |
| 4. e. | 26. c. |
| 5. c. | 27. d. |
| 6. e. | 28. c. |
| 7. b. | 29. e. |
| 8. d. | 30. e. |
| 9. d. | 31. d. |
| 10. c. | 32. c. |
| 11. b. | 33. d. |
| 12. e. | 34. a. |
| 13. a. | 35. c. |
| 14. a. | 36. d. |
| 15. a. | 37. b. |
| 16. c. | 38. e. |
| 17. a. | 39. c. |
| 18. b. | 40. d. |
| 19. c. | 41. c. |
| 20. e. | 42. a. |
| 21. c. | 43. b. |
| 22. e. | |