Solutions

Print Last Name: ➔	Print First Name: ➔	ID Number: ➔	
COURSE FINANCE	NUMBER COMM 308	SECTIONS: (➔ Circle your section) AA, AB	
EXAMINATION Final Exam VERSION BLUE	DATE June 15, 2012	TIME 3 hours 19:00 to 22:00	# OF PAGES 17 including cover
INSTRUCTOR: (➔ Underline your instructor's name) Mohammad Sabr Jay Mannadiar		DIVISION John Molson School of Business Concordia University	

READ THESE SPECIAL INSTRUCTIONS CAREFULLY

- You must submit a BLUE computer answer sheet.

- You are allowed to bring/use one or more calculators

- You are allowed to bring one language dictionary (no finance/ mathematics/economics etc. dictionary)

- For Multiple Choice Questions: All answers must be recorded IN PENCIL on the computer sheet.

- For Problems:
All answers must be recorded IN INK within this exam.
Show your calculations to earn part marks. Write in the space provided.
If you are using the back of the exam for answering any question, you should label it clearly

- Please ensure you have 17 pages (including the cover page) in this exam.

- Fill in your name and other required information IN PENCIL on the Computer Answer sheet as well as IN INK on this cover sheet.

- Blank questions or those with multiple answers will not receive any credit.

SCORES (FOR INTERNAL USE ONLY)

Part I Multiple Choice Questions	Part II Long Answer Questions				
	Question 1	Question 2	Question 3	Question 4	
(Max: 70 Points)	(Max: 11 Points)	(Max: 8 Points)	(Max: 5 Points)	(Max: 6 Points)	Total

Part I: Multiple Choice Questions (28 Questions, 70 Points Total):

- This part consists of 28 Multiple Choice Questions.
- Each question counts 2.5 points for a total of 70 points.
  - **Only answers on the computer answer sheet will be graded.**
  - **Use a pencil to mark your answers on the Computer Sheet.**

1. A _____ can lose, at most, the price of the option.

   I. Call option holder
   II. Put option holder
   III. Call option writer
   IV. Put option writer

   A) I only
   B) I and II only
   C) III only
   D) III and IV only
   E) I, II, III and IV

2. On January 1, 2011, the Simpsons Inc. had the following UCC balances:
   - Class 43, CCA rate = 30%, UCC = $25,000
   - Class 8, CCA rate = 20%, UCC = $10,000

   During 2011 and 2012, Simpsons neither bought nor sold any assets. The total CCA that Simpsons can claim in 2012 is:

   A) $6,850
   B) $7,000
   C) $9,500
   D) $10,500
   E) $45,000

   Class 43: UCC = 0.7*25000 = 17,500
   Class 8: UCC = 0.8* 10,000 = 8000
   CCA for 2012 = 0.3*17,500 + 0.2*8,000 = 6,850

3. John Doe Enterprises borrowed $149,500 for three years from the bank. At the end of the three years, they repaid the loan with one payment of $176,590. What was the quoted interest rate on the loan? Assume the interest rate is quoted as APR compounded annually.

   A) 4.25%
   B) 5.71%
   C) 6.04%
   D) 8.68%
   E) 18.12%

   Return = (176,590-149,500)/149,500 = 0.181204
   EAR = (1+0.181204)^(1/3) - 1 = 0.057081
   APR compounded Annually = EAER

4. Jane Doe Inc. invested $735,000 at an 11.25% rate of return (effective annual). The company sold their investment for $1,067,425. How much more would Jane Doe's selling price have been if they had waited another 1.5 years to sell their investment?

A) $120,085.31 $(1+0.1125)^{1.5} \times 1,067,425 - 1,067,425 = 185,102.87$
B) $185,102.87
C) $277,654.31
D) $1,252,527.87
E) Insufficient information

5. Which of the following help ensure managers act in the best interest of owners?

I. A compensation package for managers that ties their salary to the firm's share price.
II. Managers are promoted only if the firm prospers.
III. The threat that if the firm does poorly, shareholders will use a proxy fight to replace the existing management.
IV. There is a high degree of likelihood the firm will become a takeover candidate if the firm performs poorly.

A) I and II only
B) II and III only
C) I, III, and IV only
D) I, II, and III only
E) I, II, III, and IV

6. Under which of the following scenarios will increasing the payout ratio for a firm increase its equity value?

A) Never
B) Always
C) When the return on equity is equal to its cost of equity
D) When the return on equity is less than the cost of equity
E) When the return on equity is greater than the cost of equity

7. Which of the following best describes diversification?

A) The correlation coefficient between a completely diversified portfolio and the market portfolio is equal to 1 because a diversified portfolio carries only market risk.
B) As the number of assets in a portfolio increases, the amount of systematic risk decreases as a result of diversification.
C) You cannot achieve any diversification by combining 2 assets whose correlation coefficient is zero.
D) Diversification reduces the variability of returns (as measured by the standard deviation) of each individual stock held in a portfolio.
E) None of the above

8. Which of the following statements is most correct?

A) Market efficiency implies that all stocks should have the same systematic risk.
B) Insiders are able to consistently earn abnormal returns in the stock market.
C) Weak form market efficiency implies that technical analysis is of no value.
D) Some mutual funds perform better than others.
E) No one should ever be able to make money by investing in the market.

9. What is the beta of a portfolio consisting of $2,000 cash, $5,000 invested in a stock with a beta of 1.6, and $3,000 invested in a well-diversified portfolio?

A) 0.767
B) 0.867
C) 1.100
D) 1.375
E) 1.600

Asset	$	*Beta*	w_i
Cash	2,000	0	$\frac{2,000}{2,000+5,000+3,000}=0.2$
Stock	5,000	1.6	0.5
Div.Portfolio	3,000	1	0.3

$$Portfolio\_Beta = 0.2\times 0 + 0.5\times 1.6 + 0.3\times 1 = 1.1$$

10. What is the payback period of a project that costs $85,000 and generates cash flows of $20,000 in the first year, $35,000 in the second year, $25,000 in the third year, and $15,000 per year for the following 5 years?

A) 2.667 years
B) 3.000 years
C) 3.333 years
D) 3.667 years
E) 4.000 years

$3\ year\ total\ cash-flow = 20,000 + 35,000 + 25,000 = 80,000$

Need 5,000 in year 4 to complete the payback.

$\frac{5,000}{15,000} = 1/3\ of\ year\ 4\ required\ to\ complete\ payback.$

$Payback = 3 + 1/3 = 3.333\ years$

11. Canfly Airlines is considering two mutually exclusive projects, Project A and Project B. The projects have the following cash flows (in millions of dollars):

Year	Project A Cash Flow	Project B Cash Flow	Diff (A-B)
0	-$4.0	x	-4-x
1	2.0	1.7	0.3
2	3.0	3.2	-0.2
3	5.0	5.8	-0.8

The crossover rate of the two projects' NPV profiles is 9 percent. What is the cash flow for Project B at t = 0?

A) -$4.00 mill
B) -$4.22 mill
C) -$4.51 mill
D) -$8.73 mill
E) Insufficient information.

$At\ crossover: NPV_A = NPV_B \Rightarrow NPV_{A-B} = 0$

$$-4 - x + \frac{0.3}{1.09} - \frac{0.2}{1.09^2} - \frac{0.8}{1.09^3} = 0$$

$\therefore x = -\$4.51\ mill$

12. Which of the following statements is true about the weighted average cost of capital (WACC) method?

A) WACC can be used to evaluate projects in which the capital structure is significantly different from the firm's overall structure.

B) WACC is very efficient in evaluating the impact of special financing arrangements on projects because it determines the cash flows that can be distributed to shareholders after paying operating costs, financing costs, and debt repayments.

C) WACC explicitly calculates interest tax shields that are generated by debt securities for the financing of a project.

D) WACC adjusts for the tax deductibility of interest costs.

E) None of the above

13. Which of the following investments would provide an investor the highest effective annual return?

A) An investment which has a 9 percent quoted rate with semiannual compounding.
B) An investment which has a 9 percent quoted rate with monthly compounding.
C) An investment which has a 9.2 percent quoted rate with annual compounding.
D) An investment which has an 8.9 percent quoted rate with monthly compounding.
E) An investment which has an 8.9 percent quoted rate with quarterly compounding.

14. You are considering two investments: A & B. Both investments provide a cash flow of $100 per year for n years. However, investment A receives the cash flow at the beginning of each year, while investment B receives the cash at the end of each year. If the present value of cash flows from investment A is P, and the discount rate is r, what is the present value of the cash flows from investment B?

A) P/(1+r)
B) P(1+r)
C) $P/(1+r)^n$
D) $P(1+r)^n$
E) None of the above

15. You are going to pay $800 into an account at the beginning of each of 20 years (First payment at t=0). The account will then be left to compound for an additional 20 years. At the end of the 41st year you will begin receiving a perpetuity from the account. If the account pays 14%, how much each year will you receive from the perpetuity (round to nearest $1,000)?

A) $140,000
B) $150,000
C) $160,000
D) $170,000
E) None of the above

$$FV_{20} = \frac{800}{0.14} \times \left(1.14^{20} - 1\right) \times 1.14 = \$83014.734$$

$$FV_{40} = \$83014.734 \times 1.14^{20} = \frac{PMT_{41}}{0.14}$$

$$PMT_{41} = \$83014.734 \times 1.14^{20} \times 0.14 = 159,727.70$$

16. A profitability index of .85 for a project means that:

A) the present value of benefits is 85% greater than the project's costs.
B) the project's NPV is greater than zero.
C) the project returns 85 cents in present value for each current dollar invested.
D) the payback period is less than one year.
E) the project's IRR is greater than the WACC.

17. PowerRus Company is considering a project that calls for an initial cash outlay of $50,000. The expected net cash inflows from the project are $6,000 per year in perpetuity. What is the IRR of the project?

A) 7.33%
B) 8.33%
C) 10%
D) 12%
E) None of the above

$$-50,000 + \frac{6,000}{IRR} = 0$$

$$\therefore IRR = 0.12 = 12\%$$

18. Two mutually exclusive investment proposals have "scale differences" (i.e., the costs of the projects differ). Ranking these projects on the basis of IRR, NPV, and PI methods _____ give contradictory results.

A) will never
B) will always
C) may
D) will generally
E) Can't say (Insufficient information)

19. The Trans Canadian Bottling Co. is considering the purchase of a new machine that would increase the speed of bottling and save money. The net cost of this machine is $45,000. The annual cash flows have the following projections.

Year	1	2	3	4	5
Cash Flow	$ 15,000	$ 20,000	$ 25,000	$ 10,000	$ 5,000

Assuming cost of capital of 10%, should Trans Canadian buy the machine?

A) Yes. NPV is positive and IRR exceeds cost of capital.
B) Yes. NPV is positive and IRR is less than the cost of capital.
C) No. NPV is negative and IRR exceeds cost of capital.
D) No. NPV is negative and IRR is less than the cost of capital.
E) None of the above

Choice B and C are incorrect.

$$NPV = -45,000 + \frac{15,000}{1.1} + \frac{20,000}{1.1^2} + \frac{25,000}{1.1^3} + \frac{10,000}{1.1^4} + \frac{5,000}{1.1^5}$$

$$NPV = \$13,882.90$$

$\therefore$ Choices D, and E are incorrect.

20. The following information was reported last year:

	Beginning	Ending	Change
Accounts receivable	$65,250	$75,338	$10,088
Accounts payable	$42,362	$55,124	$12,762
Inventory	$51,225	$63,037	$11,812

What was the change in net working capital for the year?

A) $0
B) –$34,662
C) $9,138
D) $34,662
E) None of the above

$$\Delta NWC = \Delta AccPayables - \Delta Acc\,\mathrm{Re}ceivables - \Delta Inventory$$
$$= \$12,762 - \$10,088 - \$11,812 = -\$9,138$$
$$\therefore NWC \text{ decreases by } \$9,138.$$

Credit will be given for choice C and E

We have decided to award credit for choice E because, although the change is $9,138, students might mark choice E simply because they were looking for -$9,138.

21. Which of the following would cause the required return on a bond to increase, everything else held equal?

A) The bond's rating changes from BBB to A.
B) The bond is callable.
C) The borrower is subject to new dividend restrictions.
D) The borrower sells new non-secured junior bonds.
E) None of the above

22. Assume that all interest rates in the economy decline from 10% to 9%. Which of the following bonds will have the largest percentage increase in price?

A) A 10-year bond with a 10% coupon
B) An 8-year bond with a 9% coupon.
C) A 10-year zero coupon bond
D) A 1-year bond with a 15% coupon
E) A 1-year zero coupon bond

23. Which of the following statements is most correct?

A) The market value of a bond will always remain above its par value, provided the issuer of the bond does not go bankrupt.
B) If the Bank of Canada unexpectedly announces that it expects inflation to increase, then we would probably observe an immediate increase in bond prices.
C) The total yield on a bond is derived from interest payments and changes in the price of the bond.
D) Both A and B are true
E) Statements A, B, and C are correct.

24. The Dividend-Discount Model of stock valuation:

A) Is an application of the net present value formula.
B) Takes the net present value of expected dividends and add it to the future sale price of the stock.
C) Takes the net present value of the expected future price of the stock and add the annual dividend.
D) Takes the annual dividend, adds it to the expected future selling price and divides by the number of years to get the current price.
E) None of the above

25. Which of the following statements is most correct?

A) The slope of the security market line is beta.
B) The slope of the capital market line is the market risk premium (ER_m - RF).
C) Two securities with the same total risk can have different betas.
D) If a stock's beta doubles, its required rate of return must double.
E) All of the above statements are correct.

26. Which of the following statements is most correct?

A) Market participants are able to eliminate virtually all market risk if they hold a large diversified portfolio of stocks.
B) Market participants are able to eliminate virtually all company specific risk if they hold a large diversified portfolio of stocks.
C) It is possible to have a situation where the market risk of a single stock is less than that of a well-diversified portfolio.
D) Answers a and c are correct.
E) Answers b and c are correct.

27. Amr has $50,000 to invest and has decided to invest $10,000 in the stock of ABC and the rest in YUL. The standard deviation of the returns of ABC is 8% while the standard deviation for YUL is 14%. He is happy to see that the correlation between the two stocks is negative and is -0.15. The standard deviation of the portfolio is closest to:

A) 11.07%
B) 11.19%
C) 11.31%
D) 11.55%
E) Cannot be determined, we need the covariance between the two stocks.

$w_{ABC} = 0.2 \quad w_{YUL} = 0.8$

$\sigma^2_{port} = (0.2 \times 0.08)^2 + (0.8 \times 0.14)^2 - 2 \times 0.8 \times 0.2 \times 0.15 \times 0.08 \times 0.14$

$\sigma_{port} = \sqrt{0.0122624} = 0.110735$

28. Assume that a new regulation restricts investors to holding only one asset. A risk averse investor is considering the following two possible assets:

Asset X			Asset Y	
P	k		P	K
0.1	-3%		0.05	-3%
0.1	2%		0.1	1%
0.25	5%		0.3	4%
0.25	8%		0.3	8%
0.3	10%		0.25	10%

Asset X has a beta of 0.5 and the beta of asset Y is 1.2. Standard deviation of Asset X is 3.97%, while that of Asset Y is 3.6%. The risk free rate is 4%. Which asset should he prefer?

A) Asset X, since its beta is lower.
B) Asset Y because its expected risk (standard deviation) is lower.
C) Asset X because the ratio of its reward (expected return minus the risk free rate) to beta risk is higher.
D) Asset Y because the ratio of its reward (expected return minus the risk free rate) to standard deviation risk is higher.
E) None of the above.

$$E(X) = \sum_{i=1}^{5} p_{x,i} \times k_{x,i} = 0.0615$$

$$E(Y) = \sum_{i=1}^{5} p_{y,i} \times k_{y,i} = 0.0605$$

$$SharpeRatio_x = \frac{E(X) - RF}{\sigma_x} = \frac{0.0615 - 0.04}{0.0397} = 0.5416$$

$$SharpeRatio_y = \frac{E(Y) - RF}{\sigma_y} = \frac{0.0605 - 0.04}{0.036} = 0.5694$$

$$SharpeRatio_y > SharpeRatio_x$$

$$\therefore Pick\ stock\ Y$$

Part II: Problems (30 Points Total)

- Answer on this document, in the space provided. Use the back of the sheet if you need additional space. Label it clearly. Any work on the back of the sheet, which is not labeled clearly, will not be graded.

Q1. (11 Points) Application of Time Value Mechanics: This question has two unrelated parts. Part (a) is equity valuation. Part (b) is bond valuation. Information from part (a) should not be used in part (b)

Q1 Part a) (5 Points) Equity Valuation

GrowthRus' stock is currently selling at a price of $30 per share. The firm is experiencing a constant growth rate of 6% per year. This is expected to continue for all foreseeable future. Last years earning's per share (E_0) were $4.00 and the dividend payout ratio is 40%. The risk free rate is 8% and the market risk premium is 5%.

What is the current beta of GrowthRus stock?

Solution:

Since the firm has 40% payout ratio

$\therefore D_0 = 0.4 \times E_0 = 0.40 \times 4 = \$1.60$ -------- 1 point for getting D0

$D_1 = D_0 \times (1+g) = \$1.60 \times 1.06 = \$1.696$ -------- 1 point for getting D1

$$P_0 = \frac{D_1}{k-g} \Longrightarrow 30 = \frac{1.696}{k-0.06}$$

$$\therefore k = \frac{1.696}{30} + 0.06 = 11.65\%$$ ---------- 1 point for getting k

Using *CAPM* : ----- 1 point for using CAPM correctly

$0.1165 = 0.08 + \beta \times 0.05$

$\therefore \beta = \frac{11.65 - 0.08}{0.05} = 0.7306$ ----- 1 point for doing everything correct

Q1 Part b) (6 Points) Bond valuation

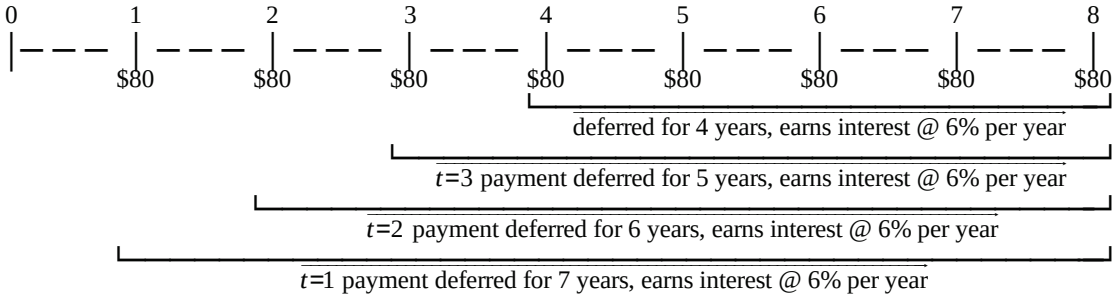
Note: *Information from part (a) should not be used in part (b)*

You are the owner of 100 bonds issued by Misery Inc. These bonds have 8 years remaining to maturity, an annual coupon payment of $80, and a par value of $1,000. Unfortunately, Misery is on the brink of bankruptcy. The creditors, including yourself, have agreed to a postponement of the next 4 interest payments (otherwise, the next interest payment would have been due in 1 year). The remaining interest payments, for years 5 through 8, will be made as scheduled. The postponed payments will accrue interest at an annual rate of 6%, and they will then be paid as a lump sum at maturity 8 years hence. The required rate of return on these bonds, considering their substantial risk, is now 28%.

What is the present value of each bond (Price today)?

Solution: -- Further breakdown of the marks are left at instructors discretion.

Timeline: -------- 1 point for getting all the timing correct



$$FV_{deferred\ payments} = \$80\times1.06^{7} + \$80\times1.06^{6} + \$80\times1.06^{5} + \$80\times1.06^{4}$$

$$= \$441.83 \text{ (Payable at time t=8)}$$

---- 2 points for correctly handling deferred payments

$$\text{Price} = PV_0 = \frac{80}{1.28^{5}} + \frac{80}{1.28^{6}}\frac{80}{1.28^{7}} + \frac{80+1000+441.83}{1.28^{8}} = \$266.88$$

--- 3 points for putting it all together.

Alternative calculation:

$$FV_{deferred\ payments} = FV_{8\ period\ annuity} - FV_{4\ period\ annuity} = \frac{80}{0.06}\left(1.06^{8}-1\right) - \frac{80}{0.06}\left(1.06^{4}-1\right) = \$441.83$$

Value at time 8 = $FV_8 = FV_{4\ period\ \$80\ annuity} + \$1000 + \$441.83$

$$= \frac{80}{0.28}\left(1.28^{4}-1\right) + 1{,}000 + 441.83 = \$1{,}923.0723$$

$$\text{Price} = P_0 = \frac{FV_8}{(1+k)^{8}} = \frac{\$1{,}923.0723}{1.28^{8}} = \$266.88$$

Q2. **(8 Points)** This question has two related parts. Information from (i) may be used in (ii)

(i) (4 Points) Mature Industries (MI) Inc. has 100,000 bonds outstanding that are selling at par. Bonds with similar characteristics are yielding 7.5% (effective annual). The company also has 1 million shares of 10.5% preferred stock (Face value $100) outstanding and 5 million shares of common stock outstanding. The preferred stock sells for $56 per share. The common stock has a beta of 1.2 and sells for $38 a share. The 3-month Treasury bill is yielding 3% and the return on the market is 12%. The corporate tax rate is 34%. What is MI Inc.'s weighted average cost of capital?

Solution:

$Bonds: k_D = 7.5\%$ (Trading at par)

$\text{Preferred}: k_p = \frac{10.5}{56} = 18.75\%$

$Common: k_c = 0.03 + 1.2 \times (0.12 - 0.03) = 13.8\%$

	Number	Price	Value	Weight (w)	k
Bonds	100,000	$1,000	$100,000,000	0.2890	7.50%
Pref	1,000,000	$56	$56,000,000	0.1618	18.75%
Common	5,000,000	$38	$190,000,000	0.5491	13.80%
Total			$346,000,000		

$WACC = 0.5491 \times 0.1380 + 0.1618 \times 0.1875 + 0.075 \times (1 - 0.34) \times 0.2890$

$= 12.0434\%$

--- 0.5 for each of the weights (total 1.5)

--- 0.5 for each of the discount rates (total 1.5)

--- 1 point for putting it all correctly in the WACC formula and getting the correct answer.

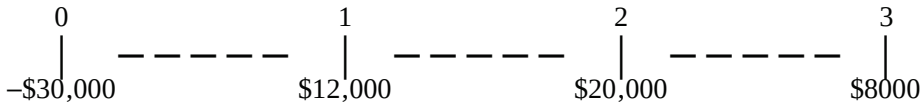
(ii) (4 Points) MI Inc. is considering a new project. The firm considers the new project to be a little riskier than its current operations. Thus, management has decided to add an additional 2% to their companies overall cost of capital when evaluating this project. The project has an initial cash outlay of $30,000 and projected cash inflows of $12,000 in year one, $20,000 in year two, and $8,000 in year three. What is the NPV of this project? Should MI accept this project?

Solution:

From part (i), WACC = 12.0434% -- Do not penalise carry forward errors

$\therefore$ Project's cost of capital $= 12.0434\% + 2\% = 14.0434\%$ --- 1 point (WACC+2%)

Timeline:



--- 1 point for getting all timing and direction of Cash-flow correct

$$NPV = -30,000 + \frac{12,000}{1.140434} + \frac{20,000}{1.140434^2} + \frac{8,000}{1.140434^3}$$

$= \$1293.5594$ --- 1 point for correct NPV

Since NPV is positive, MI should accept the project.

--- 1 point for correct final decision (conclusion based on the above calculated NPV)

Q3. (5 Points)

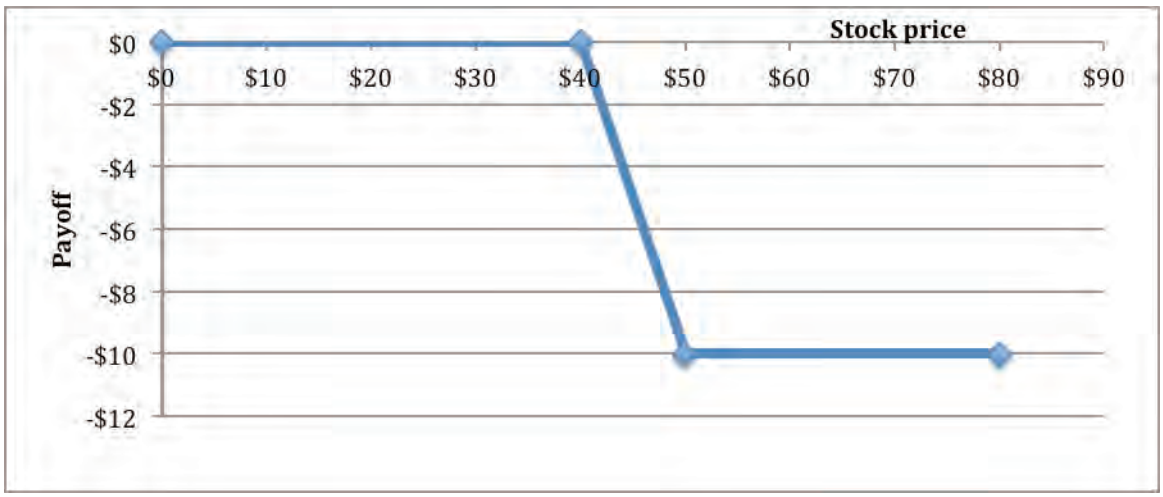
Note: when drawing payoff or profit diagrams, you need to show the location of each important point on the diagram by writing down the relevant numbers next to each point (i.e. indicate intersections with the horizontal and vertical axes and any points where the payoff/profit function changes abruptly).

An investor constructs the following portfolio:

- Short a European Call option with a strike price of $40.00.
- Long a European Call option with a strike price of $50.00

This trading strategy is known as a Bear Spread.

Draw the payoff diagram for the above bear spread.



***Note:** The above diagram is showing only the payoff. If you take the price of the two options into account, Call 50 will be cheaper than Call 40. Since the investor is short Call 40 (sells the call with strike $40) and long Call 50 (buys the call with strike $50), he will receive money for taking the above position. As long as the stock price remains below $40, the investor gets to keep the difference in the two call prices. Maximum loss will occur when the stock price increases above $50. Here the investor is betting on the stock remaining below 40.*

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-- 0.5 point for each of the axes labels (total 1 point)

-- 1 point for correctly identifying $40

-- 1 point for correctly identifying $50

-- 1 point for correctly identifying -$10

-- 1 point for getting the complete picture correct.
-- If a student has only drawn the given long and short call options
instead of the strategy, award 1 point for each correctly drawn option
(Thus maximum 2 points)
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Q4. (6 Points) Short Answers:

a) (3 Points) What is time value of money? Why do we care about it?

Time value of Money referrers to the concept that a dollar now is worth more than a dollar in the future. This is based on the premise that a person would prefer to receive a dollar today rather than a dollar on some future date. Conversely, a person would prefer to pay out a dollar some time in the future rather than pay it out immediately.

The concept of interest is a direct result of the concept of time value of money. Interest is seen as a way of compensating the individual for giving up his consumption today for consumption on some future date. To the extent that interest is central to all of investments and therefor, all of modern finance, it can be argued that time value of money serves as the foundation for all of modern finance.

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--- Part mark left at instructor's discretion.
--- zero points should be awarded if the answer is completely off
the mark.
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b) (3 Points) The limited liability corporation is the greatest single discovery of modern times… even steam and electricity are far less important…

N.M. Butler, President of Columbia University, 1911.

Why is "limited liability" deemed so important?

Limited liability restricts the amount for which an individual shareholder is personally responsible should the company become unable to repay debt obligations. If a company fails to produce the necessary capital to repay amount that it owes, the shareholders are not responsible for the entire amount, but rather only the amount that they have already invested in the form of the share price.
Limited liability is deemed to encourage entrepreneurship by allowing new firms to raise capital by selling their shares in the primary and secondary markets. Protected by limited liability, investors are more likely to invest in an entity, which they are not directly running. To a large extent, the rise of modern corporations and the entire financial markets may be attributed to "limited liability".

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--- Part mark left at instructor's discretion.
--- zero points should be awarded if the answer is completely off
the mark.
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Equation List - Comm 308 - Booth-Cleary Text

5.3	Present Value of FV_n : $PV_0 = \frac{FV_n}{(1+k)^n}$
5.4	Future value of an annuity: $FV_n = \frac{PMT}{k}\left[(1+k)^n - 1\right]$
5.5	Present Value of an annuity: $PV_n = \frac{PMT}{k}\left[1 - \frac{1}{(1+k)^n}\right]$
5.8	Present value of perpetuity: $PV_0 = \frac{PMT}{k}$
5.10	Effective rate with continuous compounding: $k = e^{QR} - 1$
5.11	Effective rate: $k = \left(1 + \frac{QR}{m}\right)^{\frac{m}{f}} - 1$
5A-2	Present value of growing perpetuity: $PV_0 = \frac{PMT_0(1+g)}{k-g} = \frac{PMT_1}{k-g}$
5A-4	Present value of growing annuity: $PV_0 = \frac{PMT_1}{k-g}\left[1 - \left(\frac{1+g}{1+k}\right)^n\right]$
6.3	Current Yield: $CY = \frac{Annual\ Interest}{B}$
6.6	Price of T-Bill given BEY: $P = \frac{F}{\left(1 + k_{BEY} \times \frac{n}{365}\right)}$
7.10	Share price with growth opportunities: $P_0 = \frac{EPS_1}{k_c} + PVGO$
7.11	Growth rate: $g = b * ROE$
8.3	Total return = Income yield + Capital gain (loss) yield = $\frac{CF_1}{P_0} + \frac{P_1 - P_0}{P_0}$
8.5	Geometric average (GM) $= \left[(1+r_1)(1+r_2)(1+r_3)\times(1+r_n)\right]^{1/n} - 1 = \left(\prod_{i=1}^{n}(1+r_i)\right)^{\frac{1}{n}} - 1$
8.6	Expected return: $ER = \sum_{i=1}^{n}\left(r_i * \text{Prob}_i\right)$
8.7	Ex-post $\sigma = \sqrt{\frac{\sum_{i=1}^{n}\left(r_i - \bar{r}\right)^2}{n-1}}$
8.8	Ex-ante $\sigma = \sqrt{\sum_{i=1}^{n}\left(\text{Prob}_i\right)\left(r_i - ER\right)^2}$
8.9	Expected portfolio return: $ER_p = \sum_{i=1}^{n}\left(w_i * ER_i\right)$
8.11	Portfolio standard deviation: $\sigma_P = \sqrt{\left(w_A\right)^2\left(\sigma_A\right)^2 + \left(w_B\right)^2\left(\sigma_B\right)^2 + 2\left(w_A\right)\left(w_B\right)\left(COV_{A,B}\right)}$
8.12	$COV_{A,B} = \sum_{i=1}^{n}\text{Prob}_i(r_{A,i} - \bar{r_a})(r_{B,i} - \bar{r_b})$

8.14	$COV_{AB} = \rho_{AB}\sigma_A\sigma_B$
8.16	If $\rho_{AB} = -1$, then: $\sigma_P = w\sigma_A - (1-w)\sigma_B$
9.3	$E(R_P) = RF + \left(\frac{E(R_A) - RF}{\sigma_A}\right)\sigma_P$
9.4	Slope of CML $= \frac{ER_M - RF}{\sigma_M}$
9.6	Sharpe Ratio $= \frac{ER_P - RF}{\sigma_P}$
9.7	$\beta_i = \frac{Cov_{i,M}}{\sigma_M^2} = \frac{\rho_{i,M}\sigma_i}{\sigma_M}$
9.8	$\beta_P = w_A\beta_A + w_B\beta_B + \ldots + w_n\beta_n$
9.9	$k_i = RF + (ER_M - RF)\beta_i$
12.2	*Option* Premium $= IV + TV$
12.5	Put Call Parity: $P + S = C + PV(X)$
13.1	$NPV = \frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \frac{CF_3}{(1+k)^3} + .. + \frac{CF_n}{(1+k)^n} - CF_0 = \sum_{t=1}^{n}\frac{CF_t}{(1+k)^t} - CF_0$
13.3	$PI = \frac{PV(Cash \text{ inflows})}{PV(Cash \text{ outflows})}$
14.1	$CF_0 = C_0 + \Delta NWC_0 + OC$
14.2	$CF_t = CFBT_t(1-T) + CCA_t(T)$
14.4	$ECF_n = SV_n + \Delta NWC_n$
14.5	$NPV = PV(CF_t) + PV(ECF_n) - CF_0$
14.6	$PV(Operating\ Cash\ Flows) = \frac{CFBT(1-T)}{k}\left[1 - \frac{1}{(1+k)^n}\right]$
14.7	$PV(CCA\ Tax\ Shield) = \frac{(C_0)(d)(T)}{d+k} * \frac{(1+0.5k)}{(1+k)} - \frac{(SV_n)(d)(T)}{d+k} * \frac{1}{(1+k)^n}$
20.8	Cost of Capital: $K_a = \frac{ROI \times IC}{V} = \frac{K_e S + K_d(1-T)D}{V} = K_e\frac{S}{V} + K_d(1-T)\frac{D}{V}$
20.9	$WACC = K_e\frac{S}{V} + K_p\frac{P}{V} + K_i\frac{D}{V}$, Where: $K_i = K_d(1-T)$
20.10	Market value: $S = P_0 \times n$
20.13	Net proceeds: $NP = \frac{I(1-T)}{K_i}\left[1 - \frac{1}{(1+K_i)^n}\right] + F\left(\frac{1}{(1+K_i)^n}\right)$
20.14	Cost of preferred shares: $K_p = D_p \Big/ NP$
20.17	$K_{ne} = \frac{D_1}{NP} + g$
20.21	$K_e = \frac{D_1}{P_0} + g = \frac{X_1(1-b)}{P_0} + b * ROE$
20.27	Cost of new equity: $K_{ne} = K_e * \frac{P_0}{NP}$