SOLUTIONS
WINTER 2016

Concordia UNIVERSITY

LAST NAME ➔	FIRST NAME ➔		ID NUMBER ➔
COURSE COMM	NUMBER 308/4		SECTIONS ➔ (Circle your section) CC, DD, G, H, I, J
EXAMINATION FINAL VERSION BLUE	DATE April 20, 2016	TIME 19:00 – 22:00 (3 Hours)	# OF PAGES = 11 Including this cover
INSTRUCTOR ➔ (Circle your Instructor's name) P. Cheng, K. Moradi Dezfouli, G. Ng, J. Slater, J. Yang		DIVISION JOHN MOLSON SCHOOL OF BUSINESS	

INSTRUCTIONS:

- **PRINT YOUR NAME and I.D. #** in the space provided above. **PRINT and MARK (FILL IN THE CIRCLES) IN PENCIL your NAME and ID#** on the computer answer (scantron) sheet. If you fail to follow these instructions, marks may be deducted.
- Students with a seven-digit ID should add "2" in front to make it an eight-digit ID. (e.g. 1234567 becomes 21234567).
- Circle your section and Instructor's name in the space above.
- **PART I:** Your responses to **PART I (multiple choice questions) MUST** be marked in **PENCIL** on the computer answer sheet. **ONLY THE RESPONSES MARKED ON THIS SHEET WILL BE GRADED. IF YOU DO NOT FILL IN THE ANSWERS ON THE SCANTRON SHEET, A SCORE OF ZERO IS AWARDED.** There are no part marks. Questions with no answer or multiple answers will not receive credit. You can use the examination itself for any rough work.
- **PART II:** Qualitative questions – point form is acceptable.
- **PART II:** Quantitative questions – **SHOW ALL YOUR CALCULATIONS** to ensure that you receive full/proper credit. If you use a financial calculator, be sure to show the formula and the inputs used.
- **PART II:** All answers must be recorded in **INK** on the exam paper itself. Please do not use red ink. If you are using the back of the exam for your answers, please label it clearly.
- **ONLY non-programmable, non-text, no-tape, noiseless calculators are permitted.** Financial calculators are permitted. ENCS sticker not required. Handheld devices capable of storing text and having calculator functionality (e.g. Palm) are **not permitted.** Programmable and graphical calculators are **not permitted.**
- **Your calculator cover and calculator user guide are NOT permitted.**
- **YOUR CELL PHONE MUST BE TURNED OFF AND MUST NOT BE WITH YOU AT YOUR EXAM SEAT.**
- **NO DICTIONARIES of any kind are permitted.**
- **NO SCRAP PAPER is permitted.**
- This exam consists of a **2-page formula sheet, 32 MC questions in part I, and 2 questions in part II.** There are **11 pages** including the cover page. You should have a **BLUE scantron sheet. Ensure that you have a complete exam before starting.**
- The time allotted for this exam is **3 hours. YOU WILL NOT GET ANY EXTRA TIME TO FILL IN YOUR SCANTRON SHEET AT THE END OF THE EXAM**
- Put your scantron sheet inside your exam when submitting the exam to the invigilator. Verify that your name and ID are on the cover page and the computer answer sheet (with the circles filled in).
- **THE EXAMINATION PAPER AND SCANTRON SHEET MUST BE RETURNED and NOT TAKEN FROM EXAMINATION ROOM NOR MUTILATED IN ANY MANNER. DO NOT RIP OUT THE FORMULA SHEETS.**

GOOD LUCK!

SCORES (FOR INTERNAL USE ONLY)

PART I MC	PART II Numerical and Short Answer Questions		TOTAL
	Question 1	Question 2	
(Max = 80 Marks)	(Max = 10 Marks)	(Max = 10 Marks)	(Max = 100 Marks)

$$PV \times (1+r)^t = FV_t \quad [5.3]$$

$$PV_0 = \frac{FV_t}{(1+r)^t}$$

$$\text{Annuity present value} = \frac{C}{r} \times \left(1 - \text{Present value factor}\right) = \frac{C}{r} \times \left\{1 - \frac{1}{(1+r)^t}\right\} \quad [6.1]$$

$$\textit{Annuity FV factor} = (\textit{Future value factor} - 1)/r = \left(\frac{(1+r)^t - 1}{r}\right) \quad [6.2]$$

$$\text{Annuity due value} = \text{Ordinary annuity value} \times (1+r) \quad [6.3]$$

$$\text{Perpetuity present value} \times \text{Rate} = \text{Cash flow} \quad [6.4]$$

$$PV \times r = C$$

$$\textit{Annuity present value factor} = \frac{1}{r} \times (1 - \text{Present } \textit{value factor}) \quad [6.5]$$

$$PV = \frac{C}{r-g} \quad [6.6]$$

$$PV = \frac{C}{r-g}\left[1 - \left(\frac{1+g}{1+r}\right)^t\right] \quad [6.7]$$

$$EAR = \left(1 + \frac{QR}{m}\right)^m - 1 \quad [6.8]$$

$$EAR = e^q - 1 \quad [6.9]$$

$$1 + R = (1+r) \times (1+h) \quad [7.2]$$

$$R \approx r + h \quad [7.4]$$

$$r = (D_1/P_0) + g \quad [8.5]$$

$$\text{PV tax shield on CCA} = \frac{[IdT^c]}{d+k} \times \frac{[1+.5k]}{1+k} - \frac{S_n dT^c}{d+k} \times \frac{1}{(1+k)^n} \quad [10.5]$$

$$\text{Total dollar return} = \text{Dividend income} + \text{Capital gain (or loss)} \quad [12.1]$$

$$Var(R) = \left(\frac{1}{(T-1)}\right) \times \left[(R_1 - \bar{R})^2 + \ldots + (R_T - \bar{R})^2\right] \quad [12.3]$$

$$\text{Geometric average return} = [(1+R_1) \times (1+R_2) \times \cdots \times (1+R_T)]^{1/T} - 1 \quad [12.4]$$

Risk premium = Expected return − Risk-free rate = $E(R_U) - R_f$ [13.1]

$$E(R) = \sum_j R_j \times P_j \quad [13.2]$$

$$\sigma^2 = \sum_j [R_j - E(R)]^2 \times P_j \quad [13.3]$$

$$\sigma = \sqrt{\sigma^2}$$

$$E(R_p) = x_1 \times E(R_1) + x_2 \times E(R_2) + \cdots + x_n \times E(R_n) \quad [13.4]$$

Covariance of returns: $COV_{L,U} = \sum_{i=1}^{n} \text{Prob}_i \left(r_{L,i} - E(r_L)\right)\left(r_{U,i} - E(r_U)\right)$

$$\sigma_P^2 = x_L^2\sigma_L^2 + x_U^2\sigma_U^2 + 2x_L x_U \text{CORR}_{L,U}\sigma_L\sigma_U \quad [13.5]$$

$$\sigma_P = \sqrt{\sigma_P^2}$$

$$\text{Covariance}_{L,U} = \text{CORR}_{L,U}\sigma_L\sigma_U \quad [13.6]$$

Total return = Expected return + Unexpected return ➔ $R = E(R) + U$

Announcement = Expected part + Surprise [13.7]

R = E(R) + Systematic portion + Unsystematic portion [13.8]

Total risk = Systematic risk + Unsystematic risk [13.9]

$$E(R_i) = R_f + [E(R_M) - R_f] \times \beta_i \quad [13.10]$$

$$\beta_2 = \frac{\text{COV}(R_2, R_M)}{\sigma^2(R_M)} \quad [13A.4]$$

$$R_E = R_f + \beta_E \times [R_M - R_f] \quad [14.2]$$

$$WACC = \left(\frac{E}{V}\right) \times R_E + \left(\frac{P}{V}\right) \times R_P + \left(\frac{D_m}{V}\right) \times R_D \times (1 - T_C) \quad [14.6]$$

$C_1 = 0$ if $(S_1 - E) \leq 0$ [25.1]

$C_1 = S_1 - E$ if $(S_1 - E) > 0$ [25.2]

$C_0 \geq 0$ if $S_0 - E < 0$ [25.4]
$C_0 \geq S_0 - E$ if $S_0 - E \geq 0$

PART I – MC QUESTIONS (80 MARKS) Part I consists of 32 multiple choice questions. Put your response on the computer answer sheet using PENCIL – ONLY these answers will be graded. Each correct response is worth 2.5 marks.

1. You purchased 200 shares of preferred stock on January 1, 2015 for $42.27 per share. The stock pays an annual dividend of $7 per share. On December 31, 2015, the market price was $46.88 per share. Calculate your dollar taxable capital gain assuming 50% of the gain is taxable.
   A. $461
   B. $922
   C. $1,161
   D. $2,322
   E. None of the above is correct.

$200(\$46.88 - 42.27)(0.50) = \$461$

2. Security X has an expected return of 12% and a standard deviation of 15%. Security Y has an expected return of 10% and a standard deviation of 9%. The correlation between X and Y is 0.70. If you invest 70% in Y and the rest in X, what is the standard deviation of your portfolio?
   A. 1.00%
   B. 1.57%
   C. 9.98%
   D. 10.80%
   E. 12.54%

$\sigma_p^2 = (0.30)^2(0.15)^2 + (0.70)^2(0.09)^2 + 2(0.30)(0.70)(0.70)(0.15)(0.09)$

$= 0.009963$

$\sigma = \sqrt{\cdot} = 0.0998\ (9.98\%)$

3. What is the crossover rate for the following two projects. Project A costs $10,000 and has annual cash flows of $1,000 forever. Project B costs $20,000 and has annual cash flows of $1,500 forever.
   A. 0.00%
   B. 5.00%
   C. 7.50%
   D. 10.00%
   E. None of the above is correct.

$NPV(B-A) = 0$

$\left[\frac{1,500}{k} - 20,000\right] - \left[\frac{1,000}{k} - 10,000\right] = 0$

$k = 0.05\ (5\%)$

4. You purchase a bond with a coupon rate of 4.8%, and an invoice price of $1,056. If the next semi-annual coupon payment is due in five months, what is the clean price?
   A. $1,076
   B. $1,065
   C. $1,060
   D. $1,052
   E. $1,036

$IP = CP + Accr'd\ Int$

$1,056 = CP + \frac{1}{6}\left(\frac{48}{2}\right)$

$CP = \$1,052$

5. A firm purchases Class 10 equipment for $1,000,000 (CCA Rate 20%) for a 10-year project. What will be the CCA tax shield in year 4? The tax rate is 40%.
   A. $40,960
   B. $46,080
   C. $69,120
   D. $115,200
   E. $200,000

$(T_c CCA)_4 = \$1M\left(1 - \frac{0.20}{2}\right)(0.8)^2(0.20)(0.40) = \$46,080$

6. A stock has year-end prices and dividends as below. What is the geometric average return?

Year	1	2	3	4
Price	$60.18	$73.66	$94.18	$89.35
Dividend	–	$0.60	$0.64	$0.72

(A.) 14.96%
B. 15.04%
C. 15.92%
D. 18.35%
E. 18.83%

$R = (73.66 - 60.18 + 0.60)/60.18 = 0.2340$
$(94.18 - 73.66 + 0.64)/73.66 = 0.2873$
$(89.35 - 94.13 + 0.72)/94.18 = -0.0436$

$\bar{R}_{geom} = [(1.2340)(1.2873)(0.9564)]^{1/3} - 1 = 0.1496\ (14.96\%)$

7. An interest rate compounded twice a year yields an EAR of 5%. This rate is equivalent to what APR compounded daily? Assume 365 days in a year.

(A.) 4.88%
B. 9.76%
C. 10.00%
D. 10.25%
E. None of the above is correct.

$\left(1 + \frac{APR}{365}\right)^{365} - 1 = 0.05$

$APR = 0.0488\ (4.88\%)$

8. RWJR has 31,000 shares outstanding with a market price of $45 per share. The firm retains 80% of its net income of $310,000. What is the firm's dividend yield?

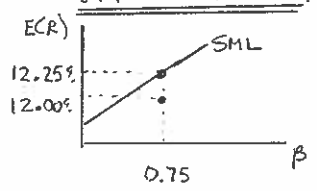
(A.) 4.44%
B. 6.67%
C. 10.00%
D. 17.78%
E. None of the above is correct.

$DPS = \frac{\$310,000(0.20)}{31,000} = \$2$ $\quad$ Div Yield $= \frac{2}{45} = 0.0444\ (4.44\%)$

9. An asset has a beta of 0.75 and a return of 12%. The expected return on the market portfolio is 15% and the risk free rate is 4%. Which of the following statements is correct?

A. This asset is correctly priced according to the CAPM because its return lies on the SML. ✗
B. This asset is underpriced according to the CAPM because its return lies above the SML. ✗
(C.) This asset is overpriced according to the CAPM because its return lies below the SML. ✓
D. This asset is overpriced according to the CAPM because its return lies above the SML. ✗
E. This asset is underpriced according to the CAPM because its return lies below the SML. ✗

$E(R) = 0.04 + 0.75(0.15 - 0.04)$
$= 0.1225\ (12.25\%)$



10. You hold $20,000 in Treasury Bills with your broker. You ask him to short 1,200 shares of ABC Inc., and the stock's current market price is $40. Your broker has a short sale maintenance margin of 30%. You will get a margin call if the stock:

A. Falls below $28.59
B. Falls below $40.00
C. Rises above $40.00
(D.) Rises above $43.59
E. None of the above is correct.

$1,200 \times \$40 = \$48,000$
$20,000$
Equity $\$68,000$

$0.30 = \frac{68,000 - 1,200P}{1,200P}$

$P = \$43.59$

11. Suppose that ConU Industries has a cost of equity of 16% and a before tax cost of debt of 6%. If the target debt to equity ratio is 2/3, and the tax rate is 35%, what is the firm's weighted average cost of capital?

A. 7.93%
B. 8.74%
(C) 11.16%
D. 11.97%
E. 12.00%

$0.16\left(\frac{3}{5}\right) + 0.06(1-0.35)\left(\frac{2}{5}\right) = 0.1116\ (11.16\%)$

12. Suppose you have the following information on two stocks. Booth Inc. has a beta of 1.7 and an E(R) of 22%. Cleary Inc. has a beta of 1.5 and an E(R) of 20%. What would the risk free rate have to be for these stocks to be correctly priced according to the CAPM?

(A) 5.00%
B. 7.96%
C. 8.00%
D. 8.96%
E. None of the above is correct.

$$\frac{0.22-R_f}{1.7} = \frac{0.20-R_f}{1.5}$$

$$R_f = 0.0500\ (5.00\%)$$

13. A firm just paid a dividend of $1.50 per share. The expected ROE for next year is 16.5% and the required return on the stock is 10%. If the firm has a retention ratio of 75%, the dividend in one year should be:

✓A. $1.56
B. $1.61
C. $1.65
(D) $1.69
E. $1.75

$D_1 = 1.50\left[1 + 0.75(0.165)\right] = \$1.6856\ (\$1.69)$

14. Ross Roberts is a JMSB student who is financing his education with a student loan. Suppose he owes $25,000 when he graduates. His loan has an interest rate of 5% with equal monthly payments over 10 years. Which of the following is correct?

(I) The EAR on this loan is 5.12% ✓
II. The monthly payment is $218.75 ✗
(III) The interest paid over the life of the loan is approximately $6,820 ✓

A. Only I is correct
B. Only II is correct
C. Only III is correct
D. Only I and II are correct
(E) Only I and III are correct ✓

$$25{,}000 = C\left\{\frac{1 - \frac{1}{\left(1+\frac{0.05}{12}\right)^{12\times 10}}}{\frac{0.05}{12}}\right\}$$

$C = \$265.1638$

$Int = \$265.1638(120) - \$25{,}000 = \$6{,}819.6566 \approx \$6{,}820$

$EAR = \left(1 + \frac{0.05}{12}\right)^{12} - 1 = 0.0512\ (5.12\%)$

15. Calculate the expected return on the following portfolio.

Stock	Return	#Shares	Stock Price	MV	$w_i(R)$
X	7%	400	$15	400($15) = $6,000	(6,000/19,100)(7%) = 2.1990%
Y	16%	100	$65	100($65) = 6,500	(6,500/19,100)(16%) = 5.4450%
X	11%	300	$22	300($22) = 6,600	(6,600/19,100)(11%) = 3.8010%
				Tot MV = Σ = $19,100	$E(R_p) = \Sigma$ = 11.4450

A. 13.60%
(B) 11.45%
C. 11.33%
D. 9.91%
E. 9.63%

Use this information to answer the following three questions.

Strike ($)	Expiration	Call Volume	Call Price ($)	Put Volume	Put Price ($)
45	Oct	91	2.80	59	0.80
45	Nov	59	4.30	54	2.30
47.50	Oct	80	1.00	22	3.12
47.50	Nov	42	2.30	20	5.25
50	Oct	28	0.30	15	7.12
50	Nov	23	2.00	12	9.00

16. Assuming the stock price is $46.25, which of the options shown in the quote are in-the-money?
I. The October $45 put ×
II. The November $50 put ✓ E>S
III. The October $45 call ✓ S>E
IV. The November $47.50 call ×
A. I and II only
B. I and III only
C. II and III only
D. II and IV only
E. III and IV only

17. You want to purchase one November $45 call contract. The option contract will cost you:
A. $80.00
B. $230.00
C. $280.00
D. $430.00
E. $900.00

$4.30(100) = $430

18. Suppose you bought 10 November $50 put contracts. Just before the option expires, the stock is selling for $45. What is your net profit (or loss)? Ignore commissions.
A. –$14,000
B. –$9,000
C. –$4,000
D. $5,000
E. $14.000

$(50-45)(10)(100) - 10(100)(9) = -\$4,000$

19. Robin Inc. currently has 800,000 shares of stock outstanding, with a market price of $20 per share and a book value of $2 per share. The firm would prefer to have its stock trade at a value between $8 and $12 per share. Of the following choices, which would allow the firm to achieve its objective?
A. $2 per share cash dividend ×
B. 2-for-3 reverse stock split × $20(3/2) = $30
C. 50% stock dividend × $20(1/1.5) = $13.33
D. 1-for-2 reverse stock split × $20(2/1) = $40
E. 2-for-1 stock split ✓ $20(1/2) = $10

20. Which of the following statements regarding the efficient market hypothesis is correct?
A. If a market is weak form efficient, it is also strong form efficient. ×
B. If a market is semi-strong form efficient, it is also weak form efficient. ✓
C. If a market is weak form efficient, it is also semi-strong form efficient. ×
D. If a market is semi-strong form efficient, it is also strong form efficient. ×
E. None of the above is correct. ×

21. Rowan Industries pays a constant $5 per share annual dividend. The market price of this stock will:
A. Be greater five years from now than it is today, provided that the market return remains constant.
B. Remain constant even as the market return varies.
C. Increase when the market return increases.
(D) Decrease if the required return increases.
E. None of the above is correct.

$P_0 = \frac{D}{r}$ If $r \uparrow \Rightarrow P_0 \downarrow$

22. On March 2, the board of directors of Ziggy Inc. declared a dividend of $0.75 per share payable on Monday, March 28 to shareholders of record as of Monday, March 14. If you bought 500 shares of the stock on Monday, March 14 for $7.50 per share, how much will you receive in dividends?
(A) $0.00
B. $1.50
C. $37.50
D. $55.00
E. $375.00

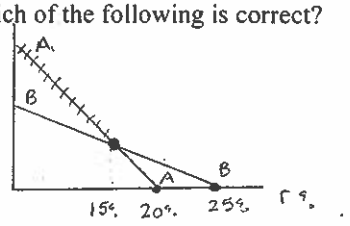
ex-div ✓ ∅

23. You need to borrow $10,000. You have two choices: Bank A at 9% compounded annually, or Bank B at 8.75% compounded semi-annually. Which would you choose and why?
A. Bank A because it has the higher quoted rate. ×
B. Bank A because the future value in one year is lower. ×
C. Bank A because it has a higher effective annual rate. ×
D. Bank B because the future value in one year is higher. ×
(E) Bank B because it has a lower effective annual rate. ✓

EAR(A) = 9.00%

$EAR(B) = \left(1 + \frac{0.0875}{2}\right)^2 - 1 = 0.0894\ (8.94\%)$

24. Suppose Deakin Inc. has two mutually exclusive projects. The IRR of project A is 20% and of project B is 25%. The NPV of project A equals that of project B at a 15% discount rate. Assuming positive discount rates, which of the following is correct?
A. The firm will always accept project B for discount rates greater than 15%. ×
(B) The firm will always prefer project A over B for discount rates less than 15%. ✓
C. The firm will always prefer project B over A for discount rates less than 20%. ×
D. The firm will always accept both projects as their IRRs are both greater than 15%. ×
E. The firm will always prefer project B over A because B's IRR is higher than that of A. ×



25. A new project has a life of 8 years, costs $250,000, and is expected to generate equal annual net cash inflows each year. The project has a discounted payback period of 7 years. Which of the following statements is correct?
A. IRR < r, and NPV > 0 ×
B. PI < 1, and IRR > r ×
C. Payback period > 7, and AAR < r ×
(D) IRR > r, and Payback period < 8 ✓
E. PI > 1, and NPV < 0 ×

∵ Discounted Payback < life ⇒ NPV > 0 AND Payback ≤ 7 years
⇒ PI > 1
IRR > r

26. Risk that affects a large number of assets is called:
(A) Systematic risk. ✓
B. Diversifiable risk. ×
C. Non-market risk. ×
D. Asset specific risk. ×
E. Total risk. ×

27. If a stock's beta is 1.2 during a period when the market portfolio was up by 10%, then we would expect the return on this stock to (all else the same):
A. Gain less than 10%. ×
B. Gain exactly 10%. ×
C. Gain more than 10%. ✓
D. Lose less than 10%. ×
E. Lose more than 10%. ×

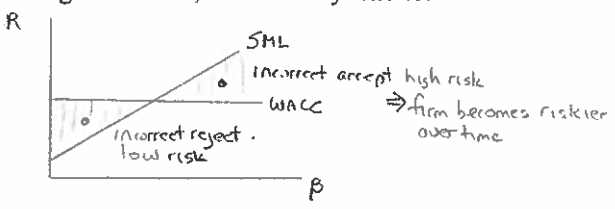
28. Which of the following statement/s is/are correct?
A. A stock's capital gains yield can never be equal to the dividend growth rate. ×
B. A stock's dividend yield is equal to the realized return less the capital gains yield. ✓
C. The capital gains yield on a stock equals the stock price today divided by the stock price in one period. ×
D. Both A and B are correct. ×
E. Both B and C are correct. ×

29. Which of the following statements are true?
I. Bond prices are inversely related to market interest rates. ✓
II. A high coupon bond is less interest rate sensitive than a low coupon bond. ✓
III. The yield to maturity will be greater than the coupon rate when a bond is selling at a premium. ×
IV. The coupon rate will be more than the yield to maturity when a bond sells at a discount. ×
A. I and II only
B. I and III only
C. I and IV only
D. II and III only
E. III and IV only

30. If capital markets are efficient, then:
A. It is possible to profit regularly from publicly available information. ×
B. There is no reason to believe that prices are too high or too low. ✓
C. It is not possible to make money by playing the stock market. ×
D. Prices will adjust slowly when reacting to new information. ×
E. Historical price trends will give you a good idea of where prices are headed in the future. ×

31. Two perpetuities are identical in every way except that perpetuity A makes annual payments of $P starting two years from today, and perpetuity B makes annual payments of $P starting one year from today. It must be true that the present value of:
A. Perpetuity B is equal to that of perpetuity A. ×
B. Perpetuity B is greater than that of perpetuity A by $P. ×
C. Perpetuity A is greater than that of perpetuity B by $P. ×
D. Perpetuity A is greater than that of perpetuity B by the present value of $P for one year. ×
E. Perpetuity B is greater than that of perpetuity A by the present value of $P for one year. ✓

32. If a firm uses a constant WACC for capital budgeting rather than using the CAPM, the firm may tend to:
A. Incorrectly accept low risk projects. ×
B. Incorrectly reject high risk projects. ×
C. Become more risky over time. ✓
D. Reject projects with a risk equal to that of the firm. ×
E. None of the above is correct. ×



PART II – NUMERICAL AND SHORT ANSWER QUESTIONS

QUESTION 1 – PART A (5 MARKS)

Spectre Inc. just paid a dividend of $3.50 per common share. The growth rate in dividends is expected to be 20% per year for the first four years, and 2% per year thereafter. Investors require a 16% return per year on this stock for the first four years, and 12% per year thereafter. Calculate the current share price.

$D_0 = \$3.50 \quad g_{1-4} = 0.20 \quad g_{5\rightarrow} = 0.02 \quad r_{1-4} = 0.16 \quad r_{5\rightarrow} = 0.12 \quad P_0 = ?$

$$P_0 = \left\{\frac{(3.50)(1.20)}{0.16-0.20}\right\}\left\{1-\left(\frac{1.20}{1.16}\right)^4\right\} + \left\{\frac{3.50(1.20)^4(1.02)}{0.12-0.02}\right\}\left\{\frac{1}{(1.16)^4}\right\}$$

$= 15.2492 \quad + 40.8847$

$= \$56.1339$

QUESTION 1 – PART B (5 MARKS)

Westerfield Inc. issues bonds with a $1,000 face value and a 20-year maturity. The bond makes semi-annual coupon payments of $30 each until the end of year 10. After that, the bond makes semi-annual coupon payments of $40 each until maturity. However, due to cash constraints, the firm makes no coupon payments on the bond in year one, and instead pays these coupons at maturity. If investors require an 8% rate of return over the life of the bond, what is the bond's value today?

$F = \$1{,}000 \quad T = 20 \text{ years} \times 2 = 40 \text{ periods} \quad \text{semiannual bond} \quad \$C_{3-20} = \$30 \quad \$C_{21-40} = \$40 \quad r = 0.08$

$B_0 = ? \quad \$C_{1-2} = \$0 \quad \text{extra } \$C_{40} = \$30 \times 2 = \$60 \quad r_{\text{per period}} = 0.04$

$$B_0 = \$30\left\{\frac{1-\frac{1}{(1.04)^{18}}}{0.04}\right\}\left\{\frac{1}{(1.04)^2}\right\} + \$40\left\{\frac{1-\frac{1}{(1.04)^{20}}}{0.04}\right\}\left\{\frac{1}{(1.04)^{20}}\right\} + \$1{,}060\left\{\frac{1}{(1.04)^{40}}\right\}$$

$= 351.1270 \quad + 248.0979 \quad + 220.7864$

$= \$820.0113$

QUESTION 2 – PART A (4 MARKS)

Patrick Co.'s only long term debt is annual coupon bonds with a yield to maturity of 13%, selling at 90% of book value. The firm's only equity is common stock with a beta of 1.2, selling at 1.5 times book value. The firm's tax rate is 40%. The risk free rate is 4%, and the market risk premium is 10%. Calculate the firm's after tax cost of capital, given the book value balance sheet below.

Assets ($Millions)		Liabilities & Equity ($Millions)	BV	MV	
Cash	$ 480	Accounts Payable	$ 152	–	–
Accounts Receivable	240	Long Term Debt	(1,000	)(0.90) =	$ 900 = D
Net Fixed Assets	2,160	Equity(Common Stock)	(1,728	)(1.50) =	$ 2,592 = E
Total	$2,880	Total	$2,880	Σ	$3,492 = V

Bonds: $YTM = 0.13$, $MV = 90\%(BV)$ Eq: $\beta = 1.2$, $MV = 1.5(BV)$ $T_c = 0.40$ $R_f = 0.04$, $E(R_m) - R_f = 0.10$ WACC ?

$R_D = YTM = \underline{0.13}$

$R_E = 0.04 + (0.10)(1.2) = \underline{0.16}$

$$WACC = 0.16\left(\frac{2,592}{3,492}\right) + 0.13(1-0.40)\left(\frac{900}{3,492}\right)$$

$$= 0.1188 + 0.0201$$

$$= \underline{0.1389 \quad (13.89\%)}$$

QUESTION 2 – PART B (6 MARKS)

Tax Shield Corp. is considering a 15-year project and paid $10,000 for a study of this project. The firm forecasts revenue of $865,000 at the end of year 1, and expects revenue to grow at 5% per year. The relevant costs are estimated at 40% of revenue. The equipment costs $750,000, has a useful life of 15 years, has a zero salvage value, and has a CCA rate of 20%. The firm needs to invest $100,000 in net working capital up front, and no additional net working capital is required. The appropriate discount rate is 16% and the firm's tax rate is 30%. What is the NPV of this project?

Sunk cost (ignore) = $10,000 $Rev_1 = \$865,000$ $g = 0.05$ $N = 15$ years $Cost = 0.40(Rev)$

$C_0 = \$750,000$ $S_{15} = \$0$ $CCA = 0.20$ NWC_0 invest $= \$100,000$ recovery $NWC_{15} = \$100,000$ (NWC signed below)

$k = 0.16$ $T_c = 0.30$ $NPV = ?$

→ CAPITAL INVEST : $-750,000 + 0 = -750,000.00$

→ ΔNWC : $$-100,000 + 100,000\left\{\frac{1}{(1.16)^{15}}\right\} = -100,000 + 10,792.70 = -89,207.30$$

→ CFO/OCF : $(R-C)(1-T_c)$ as growing annuity

$$\left\{\frac{865,000(1-0.40)(1-0.30)}{0.16-0.05}\right\}\left\{1-\left(\frac{1.05}{1.16}\right)^{15}\right\} = +2,561,686.06$$

→ PV(CCA TS) : $$\left\{\frac{750,000(0.20)(0.30)}{0.16+0.20}\right\}\left\{\frac{1+0.5(0.16)}{1.16}\right\} - 0 = +116,379.31$$

$NPV = \underline{\$1,838,858.07}$