

### 3530 F10 Final Exam and Solutions - Type A

1. Two years ago Zippy Inc. issued a zero-coupon bond with a \$1,000 face value and a ten year maturity. If the bond's yield to maturity today is 3.50%, what is the current price of the bond? (assume annual compounding)

- A) \$708.92
- B) \$759.42
- C) \$825.50
- D) \$933.51
- E) \$1000

#### Solution B

$$PV \text{ of bond} = 1000 / (1.035)^8 = \mathbf{\$759.41}$$

2. Topaz Bank's earnings and dividends are expected to grow at a rate of 10% during the next 2 years, at 8% in the third year, and at a constant rate of 6% thereafter. If last dividend paid was \$1.20 and the required rate of return on its common stock is 12%. How much should you pay today for one share of Topaz Bank?

- A) \$23.17
- B) \$25.55
- C) \$27.71
- D) \$31.16
- E) \$35.41

#### Solution A

$$DIV_0 = \$1.20$$

$$DIV_1 = \$1.32$$

$$DIV_2 = \$1.452$$

$$DIV_3 = \$1.5682$$

$$DIV_4 = \$1.6623$$

$$P_3 = DIV_4 / (r-g) = 1.6623 / (.12-.06) = \$27.71$$

$$\begin{aligned} P_0 &= DIV_1 / (1+r) + DIV_2 / (1+r)^2 + DIV_3 / (1+r)^3 + P_3 / (1+r)^3 \\ &= 1.32 / (1.12) + 1.452 / (1.12)^2 + 1.5682 / (1.12)^3 + 27.71 / (1.12)^3 \\ &= \mathbf{\$23.17} \end{aligned}$$

3. Microlight Corp. will finance its expansion through additional bond sales. Its current outstanding bonds are selling for \$919.71. These have a 6% coupon rate, pay interest semi-annually and will mature in 12 years. What must the coupon rate of the new bonds be in order to sell the issue at par, if they will also mature in 12 years and pay semi-annual coupons?

- A) 3.00%
- B) 3.50%
- C) 6.00%
- D) 7.00%
- E) 8.00%

### Solution D

:

Need to find YTM of old bonds -> this must be coupon rate of new bonds if new bonds are to sell at par (\$1000).

*Using your calculator:*

PV = -919.71, PMT = 30, n = 12x2 = 24, FV= \$1000, COMP "i"

i = 3.50% => YTM old = 3.50% x 2 = 7.00%

=> coupon of new bonds = 7.00%

4. An investment today of \$25,000 promises to return \$10,000 annually for the next three years. What is the real rate of return on this investment if inflation averages 6 percent annually during the 3 years?

- A) 3.5 %
- B) 3.7 %
- C) 9.7 %
- D) 11.0 %
- E) 12.7 %

### Solution A

Solving with financial calculator, the IRR = 9.701%.

Then,  $1.09701/1.06 = 1.0349$  or 3.5% real return.

5. You are planning to buy a new condominium in Toronto. The Condo is worth \$320,000; you will put a 10% down payment and obtain a 25-year fixed rate mortgage at 6.25% (APR semi-annually compounded) for the rest. Assuming that monthly payments begin in one month, how much interest will you pay (in dollars) over the life of the loan?

- A) \$198,550
- B) \$277,711
- C) \$297,865
- D) \$308,567
- E) \$320,000

### Solution B

Find Semi-annual rate:  $i_s = 6.25\% \rightarrow .0625/2 = .03125$

EAR:  $EAR = (1.03125)^2 - 1 = .0634766$

monthly rate:  $i_m = (1 + 0.0634766)^{1/12} - 1 = 0.005142$ .

Find Number of months in mortgage:

$$n = 25\text{yrs} \times 12\text{mths/yr} = 300 \text{ months}$$

Find the monthly payment with a PV of \$288,000 (\$320,000 x 90% )

***Using your calculator:***

$$PV = -288,000, n=300, i=0.5142\%, FV=0, PMT=? \text{ Answer} = \underline{\$1885.70}$$

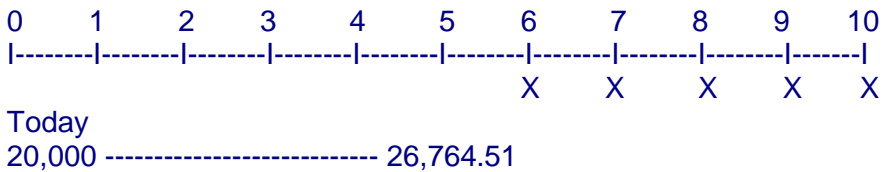
The total interest paid is given by:

$$\begin{aligned} \text{Interest paid} &= \text{Total payments} - \text{Principal} \\ &= \$1885.70 \times 300 - \$288,000 \\ &= \underline{\underline{\$277,711}} \end{aligned}$$

6. If you deposit \$20,000 today into a savings account which earns 6% interest compounded annually; and if you will make 5 annual equal withdrawals starting at the end of year 6 so that there will be no money left after your last withdrawal (Year 10), how much will each annual withdrawal be?

- A) \$4,000.00
- B) \$4,163.15
- C) \$6,353.80
- D) \$6,735.03
- E) \$7,033.89

**Solution C**



Step 1: First find the FV of \$20,000 as of year 5  
 -> PMT=0, n=5, i=6%, PV= -20,000 FV=? FV= 26,764.51

Step 2: Then use this amount as the PV of 5 year annuity of \$X  
 → n=5, i=6%, PV= -26,764.51, FV= 0, PMT=?, PMT= **\$6,353.80**

**Please use the following information for Questions 7 to 12.**

The Yoon Park Company can choose between two systems that do the same work. System A costs \$30,000 and reduces operating expense by \$10,000 after tax each year for five years. System B costs \$25,000 and reduces operating expense by \$8,000 after tax each year for seven years. The discount rate is 7%.

7. The discounted payback period of System A is approximately:
- A) 3.0 years
  - B) 3.4 years
  - C) 3.5 years
  - D) 3.7 years
  - E) 3.9 years

**Solution C**

Initial cost	30,000
PVA 10,000, 3 yr, 7%	= <u>26,243</u>
Not paid back	3,757
PV 10,000, 4 yr, 7%	7,629

Fraction of fourth year =  $3757/7629 = .49$ . Add the first three years = **3.5 years**.

8. The net present value of System A is approximately:

- A) -\$15,000
- B) \$11,000
- C) \$20,000
- D) \$27,500
- E) \$41,000

**Solution B**

$NPV = -30,000 + PVA\ 10,000\ (5\ yr,\ 7\%) = \mathbf{11,002}$

9. The internal rate of return of System A is approximately:

- A) 7.0%
- B) 11.6%
- C) 14.7%
- D) 19.9%
- E) 21.2%

**Solution D**

Using your calculator:  $PV = -30000, N=5, PMT=10,000, COMP\ I \rightarrow \mathbf{19.9\%}$

10. The Profitability Index of System A is approximately:

- A) 0.37
- B) 0.47
- C) 0.52
- D) 0.65
- E) 0.72

**Solution A**

$PI = NPV/Initial\ Cost = 11000/30000 = \mathbf{37\%}$

11. The Profitability Index of System B is approximately:

- A) 0.25
- B) 0.37
- C) 0.52
- D) 0.65
- E) 0.72

**Solution E**

$NPV = -25,000 + PVA\ 8,000\ (7\ yr,\ 7\%) = \mathbf{18,114}$

$PI = NPV/Initial\ Cost = 18,114 / 25,000 = \mathbf{72\%}$

12. Which system(s) should the company choose?

- A) Neither system
- B) Both systems
- C) System A
- D) System B
- E) We cannot make a decision until we have more information.

**Solution D**

Since the projects have different lives, we must compare using Equivalent Annual Cost:

	<u>System</u>	<u>System B</u>
NPV	11,000	18,114
I	7%	7%
N	5yr	7 yr
PMT	2,683	3,361

These are positive NPVs. Hence, the higher EAC means that the system *saves mores money*. Therefore, choose **System B**

**Please use the following information for Questions 13 to 16.**

You are evaluating a project for The Ultimate recreational tennis racket, guaranteed to correct that wimpy backhand. You estimate the sales price per unit of The Ultimate to be \$400 and sales volume to be 1,000 units in year 1, 1250 units in year 2, and 1325 units in year 3. The project has a three year life. Variable costs amount to \$225 per unit and fixed costs are \$100,000 per year. The project requires an initial investment of \$160,000 which is subject to a CCA rate of 30% (declining balance and the half-year rule applies). The salvage value of the initial investment at the end of year 3 is \$35,000. The initial requirement (year 0) net working capital (NWC) investment is \$75,000 and NWC will be fully recovered at the end of year three. The tax rate is 34% and the required return on the project is 10%.

13. What is cash flow from operations for the project in the first year, excluding CCA tax shields?

- A) \$49,500
- B) \$75,000
- C) \$90,000
- D) \$144,000
- E) \$175,000

**Solution A**

$$\begin{aligned}
 \text{CFop (excl CCA tax shield)} &= \text{Cash revenues} - \text{Cash expenses} \times (1-T) \\
 &= [(400 \times 1000) - (225 \times 1000) - 100,000] \times (1-.34) \\
 &= \mathbf{\$49,500}
 \end{aligned}$$

14. What is the net effect of the Net Working Capital requirement and recovery on the project's NPV?

- A) It increases NPV by \$18,651
- B) It increases NPV by \$56,349

- C) It reduces NPV by \$18,651
- D) It reduces NPV by \$56,349
- E) It reduces NPV by \$75,000

**Solution C**

NWC year 0 = \$75,000 outflow

NWC year 3 = \$75,000 inflow

Net effect =  $-75,000 + 75,000/(1.10)^3 = -\$18,651$  outflow or reduction in NPV

15. What is the present value of the CCA tax shields over the project's life?

- A) \$6,705
- B) \$32,240
- C) \$38,945
- D) \$67,833
- E) \$71,125

**Solution B**

$$\text{Present value of CCA tax shield} = \left[ \frac{CdT_c}{r+d} \right] \left[ \frac{1+0.5r}{1+r} \right] - \left[ \frac{SdT_c}{d+r} \right] \left[ \frac{1}{(1+r)^t} \right]$$

d= 0.30  
 r = 0.10  
 Tc = 0.34  
 C=160,000  
 S=35,000

PVCCATS (first half of equation)

$$\begin{aligned}
 &= \{ [160,000 \times .30 \times .34] / (.10 + .30) \} \times [(1 + .5 \times .10)/(1.10)] \\
 &= [16,320 / 0.40] \times [1.05 / 1.10] \\
 &= 40,800 \times 0.954545 \\
 &= \underline{38,945.45}
 \end{aligned}$$

Second half of equation:

$$\begin{aligned}
 &= [35,000 \times .30 \times .34] / .40 + 1/(1.10)^3 \\
 &= 8925 \times .7513 \\
 &= \underline{6705.49}
 \end{aligned}$$

**PVCCATS = 38,945.45 - 6705.49 = 32,239.97**

16. What is the project's NPV?

- A) \$26,810
- B) \$59,050
- C) \$77,701
- D) \$98,838
- E) \$139,100

## Solution B

$$Co = -160,000$$

CF from operations (excl CCA tax shields):

$$\text{Year 1} = 49,500$$

$$\text{Year 2} = [1250 \times (400 - 225) - 100,000] \times (1 - .34) = 78,375$$

$$\text{Year 3} = [1325 \times (400 - 225) - 100,000] \times (1 - .34) = 87,037.50$$

$$\text{PV CFop} = 49,500/(1.10) + 78,375/(1.10)^2 + 87,037.5/(1.10)^3 \\ = \underline{176,165.30}$$

$$\text{PV salvage} = 35,000/(1.10)^3 = \underline{26,296.02}$$

$$\text{PV of all changes in NWC} = \underline{-18,651}$$

$$\text{PVCAATS} = \underline{32,240}$$

$$\text{NPV} = -160,000 + 176,165 + 26,296 - 18,651 + 32,240 = \mathbf{59,050.}$$

17. What is the accounting break-even point in terms of units sold? Price = \$100 per unit; variable cost = \$24 per unit; fixed cost = \$40,000 per year; depreciation = \$10,000 per year. Assume a discount rate of 10%, project initial outlay of \$100,000, project life of 10 years, and ignore taxes.

- A) 527 units
- B) 624 units
- C) 658 units
- D) 925 units
- E) 1,130 units

## Solution C

$$\text{B/E acc} = (FC + D) / (P - v) = (40000 + 10000) / (100 - 24) = \mathbf{658 \text{ units}}$$

18. Given the following information, what is the NPV break-even in terms of units sold? Initial investment = \$300,000; variable cost = \$120; fixed cost = \$65,000; price = \$150; life = six years; required return = 10%; depreciation = \$50,000. Ignore taxes.

- A) 1,392 units
- B) 2,600 units
- C) 4,167 units
- D) 4,463 units
- E) 5,561 units

**Solution D**

$$CFop = (S - VC - FC)(1 - Tc) + D * Tc$$

$$= (150Q - 120Q - 65000) + 50000 * 0 = 30Q - 65000$$

$$NPV = 0 \Rightarrow C_0 = CFop * PVIFA(r,t)$$

$$300000 = (30Q - 65000) * PVIFA(10,6)$$

$$300000 / 4.3553 = 30Q - 65000$$

$$Q = \mathbf{4463 \text{ units}}$$

19. A firm has a DOL = 2.5. If sales decrease by 20%, then profit will \_\_\_\_\_.

- A) decrease by 20%
- B) increase by 5%
- C) increase by 20%
- D) decrease by 12.5%
- E) decrease by 50%

**Solution E**

$$DOL = \% \Delta Profit / \% \Delta Sales$$

$$\% \Delta Profit = DOL \times \% \Delta Sales = 2.5 * (-0.2) = \mathbf{-0.50}$$

20. A three-year project will cost \$60,000 to construct. This will be depreciated straight-line to zero over the three-year life. The price per unit sold is \$20 and the variable cost per unit sold is \$10. Fixed costs are \$30,000 per year. If you expect to sell 7,000 units per year, what is the cash flow from operations in year 2, assuming a required return of 15% and a tax rate of 30%?

- A. \$17,000
- B. \$20,000
- C. \$34,000
- D. \$48,000
- E. \$55,000

$$Dep = 60000 / 3 = \$20,000$$

$$CF_{op} = (S - VC - FC) \cdot (1 - T_c) + D \cdot T_c = [7000(20 - 10) - 30000] \cdot (1 - T_c) + 20000 \cdot 0.30 = \$34,000$$

21. Julia purchased a 5 year 6% annual coupon bond one year ago for \$990. She sold the bond today when the market rate of return is 4.5%. If the Consumer Price Index has increased by 2% this past year then what would be her nominal rate of return on this investment?

- A) 7.07%
- B) 8.16%
- C) 10.30%
- D) 11.67%
- E) 12.51%

### Solution E

Inflation (CPI) has no bearing on the answer as the question asks for the nominal rate of return and not the real rate of return.

Price of bond today is the present value of future cash flows (4 years left to maturity) and can be solved using  $FV = \$1,000$ ;  $PMT = \$60$ ;  $r = I/Y = 4.5\%$ ;  $n = 4$  therefore  $PV = \$1,053.81$ . The rate of return over the last year can be solved using  $FV = \$1,053.81$ ;  $PV = \$990$ ;  $PMT = \$60$ ;  $n = 1$  therefore  $r \Rightarrow$  **12.51%** which is the nominal rate or return over one year.

22. Over the past four years the stock of ABC Company produced annual returns of 4%, -18%, -21%, and 48%. The beta of this stock is 1.2. Based on this information, what is the standard deviation for this stock?

- A) 18.03%
- B) 27.58%
- C) 31.85%
- D) 34.62%
- E) 55.16%

### Solution C

The question relates to a sample therefore the standard deviation of a sample = square root of the stock's sample variance. The beta of the stock (systematic risk) is irrelevant to this question.

$$\begin{aligned} \text{Stocks expected return} &= [4\% + (-18\%) + (-21\%) + 48\%] / 4 = 3.25\% \\ \text{Stocks sample variance} &= (4\% - 3.25\%)^2 + (-18\% - 3.25\%)^2 + (-21\% - 3.25\%)^2 + (48\% - 3.25\%)^2 / N - 1 = 3042.75 / 3 = 1014.25 \\ \text{Standard deviation} &= \text{square root of } 1,014.25 = \mathbf{31.85\%} \end{aligned}$$

23. You have \$74,000 to invest and you want to create a portfolio of 2 stocks which you feel are well diversified. What is the total risk of your portfolio if invest \$50,320 in stock "A" and the rest in stock "B"?

State of Economy	Probability	Return	
		Stock A	Stock B
Boom	20%	17%	10%
Normal	80%	7%	8%

- A) 2.7%
- B) 3.0%
- C) 3.2%
- D) 4.1%
- E) 4.3%

**Solution B**

Total risk is measured based on the standard deviation of the portfolio. Portfolio weighting of A = \$50,320 / \$74,000 = 68% therefore portfolio weighting of B = 1 – 68% = 32%

$$E(r)_{\text{Boom}} = (0.68 \times 0.17) + (0.32 \times 0.10) = 0.1156 + 0.032 = .1476$$

$$E(r)_{\text{Normal}} = (0.68 \times 0.07) + (0.32 \times 0.08) = .0476 + .0256 = .0732$$

$$E(r)_{\text{Portfolio}} = (0.20 \times 0.1476) + (0.80 \times 0.0732) = .02952 + .05856 = .08808$$

$$\text{Var}_{\text{Portfolio}} = [0.20 \times (0.1476 - 0.08808)^2] + [0.80 \times (0.0732 - 0.08808)^2] = .000708526 + .000177132 = .000885658$$

Std dev = square root of .000885658 = 0.02976 or approximately **3.0%**

24. You have the option to invest in a one year project that is equally likely to have a positive return of 100% as it is to have a negative return of 100%. What is the standard deviation of the outcome of this project?

- A) 0%
- B) 50%
- C) 71%
- D) 100%
- E) Cannot be determined based on the above information.

**Solution D**

$$E(r) = 0.5 \times 100\% + 0.5 \times -100\% = 0\%$$

$$\text{Var}(r) = [(100\% - 0\%)^2 + (-100\% - 0\%)^2] / N = 20,000 / 2 = 10,000$$

Standard Deviation = square root of 10,000 = **100%**

25. Which one of the following stocks is correctly priced if the risk free rate of return is 3.2% and the market risk premium is 8.4%?

Stock	Beta	Actual Return
A	0.72	8.62%

B	1.46	15.79%
C	1.38	14.79%
D	1.01	12.02%
E	0.95	11.40%

- A) Stock A
- B) Stock B
- C) Stock C
- D) Stock D
- E) Stock E

### Solution C

Using the CAPM we can calculate the expected return of each stock

$$E(r)_A = 0.032 + (0.72 \times 0.084) = 0.0925$$

$$E(r)_B = 0.032 + (1.46 \times 0.084) = 0.1546$$

$$E(r)_C = 0.032 + (1.38 \times 0.084) = \mathbf{0.1479}$$

$$E(r)_D = 0.032 + (1.01 \times 0.084) = 0.1168$$

$$E(r)_E = 0.032 + (0.95 \times 0.084) = 0.1118$$

Stock C is correctly priced as the actual return equals the expected return

26. Which of the following statements is most accurate if you had a stock portfolio made up as follows?

Stock	\$ Invested	Beta
A	\$3,500	1.12
B	\$1,000	1.81
C	\$9,500	0.84

- A) The systematic risk of ABC portfolio and market portfolio are almost the same.
- B) ABC is a very aggressive portfolio compared to the market portfolio.
- C) ABC is a very defensive portfolio compared to the market portfolio.
- D) The systematic risk of ABC portfolio is twice that of the market portfolio.
- E) None of the above statements are correct.

### Solution A

Portfolio Beta is the weighted average of the individual betas.

$$\text{Value}_{\text{Portfolio}} = \$3,500 + \$1,000 + \$9,500 = \$14,000$$

$$\text{Beta}_{\text{Portfolio}} = (\$3,500 / \$14,000 \times 1.12) + (\$1,000 / \$14,000 \times 1.81) + (\$9,500 / \$14,000 \times 0.84) = 0.28 + 0.1293 + 0.57 = 0.9793 = 0.98 \text{ which is almost equal to the market portfolio of 1.}$$

27. You want your portfolio beta to be 1.10. Currently, your portfolio consists of \$3,000 invested in stock A with a beta of 1.65 and \$2,000 in stock B with a beta of 0.72. You have another \$5,000 to invest and want to divide it between an asset with a beta of 1.48 and a risk-free asset. How much should you invest in the risk-free asset?

- A) \$0
- B) \$775
- C) \$1,885
- D) \$3,115
- E) \$5,000

**Solution C**

$$\begin{aligned} \text{Beta}_{\text{Portfolio}} = 1.10 &= (\$3,000 / \$10,000 \times 1.65) + (\$2,000 / \$10,000 \times .72) + (x / \$10,000 \times \\ &1.48) + ((\$5,000 - x) / \$10,000 \times 0) \\ &= .495 + .144 + .000148x + 0 \\ 461 &= .000148x; \\ x &= \$3,114.86; \\ \text{Risk-free asset} &= \$5,000 - \$3,114.86 = \mathbf{\$1,885.14} \end{aligned}$$

28. Ashley Corporation has a company beta of 0.92 and a cost of equity of 10.8% and Ashley is entirely financed with equity. Division A within Ashley Corp. has an estimated beta of 1.47. What is the cost of capital for Division A if the market risk premium is 6%?

- A) 9.9%
- B) 11.6%
- C) 14.1%
- D) 15.9%
- E) 16.7%

**Solution C**

Using the CAPM we can derive the risk free rate of return.  
Then use the risk free rate to calculate Division A's cost of capital  
 $.108 = r_f + (.92 \times .06)$ ; solving for  $r_f = .0528$   
Therefore  $R_{\text{eDivision}} = .0528 + (1.47 \times .06) = 14.1\%$

29. Joshua Inc. wants to have a weighted average cost of capital (WACC) of 10%. The firm has an after tax cost of debt of 4% and a before tax cost of equity of 12%. Joshua's tax rate is 40%. What debt to equity ratio is needed for the firm to achieve their targeted weighted average cost of capital?

- A) 0.19
- B) 0.33
- C) 0.50
- D) 0.67
- E) 0.75

**Solution B**

The tax rate is irrelevant in this case as we are given the after tax cost of debt and the cost of equity is the same before and after tax.

$$0.10 = [W_e \times 0.12] + [(1 - W_e) \times 0.04] = 0.12W_e + 0.04 - 0.04W_e$$

$$0.06 = 0.08W_e; W_e = 0.75; W_d = 1 - W_e = 1 - 0.75 = 0.25$$

$$\text{Debt to equity ratio} = 0.25 / 0.75 = \mathbf{0.33}$$

30. Tayshon Inc. has 230,000 shares of common stock outstanding at a market price of \$40 a share. Next year, Tayshon expects to pay an annual dividend of \$1.80 per share and historically has had a dividend growth rate of 3%. Tayshon also has 8,000 bonds that are currently selling at a 2% premium on face value. The bonds pay a 9% annual coupon, and will mature in 5.093 years. The company's tax rate is 35%. What is Tayshon's weighted average cost of capital (WACC)?

- A) 5.4%
- B) 6.6%
- C) 7.5%
- D) 8.5%
- E) 9.6%

#### Solution B

$$\text{Debt} = 8,000 \times \$1,020 = \$8,160,000$$

$$\text{Equity} = 230,000 \times \$40 = \$9,200,000$$

$$\text{Assets} = \$17,360,000$$

Calculate cost of equity using the dividend discount model

$$R_e = (\$1.80 / \$40) + 3\% = 0.075 \text{ or } 7.5\%$$

Cost of debt is the yield to maturity

$$\text{Where } n = 5.093; PV = \$1,020; FV = \$1,000; PMT = \$90$$

$$\text{YTM} = 8.5\%$$

$$\text{WACC} = (8,160,000 / 17,360,000) \times 8.5\% \times (1 - 0.35) + (9,200,000 / 17,360,000) \times 7.5\% = 0.06572 \text{ approx } \mathbf{6.6\%}$$

31. Junior Inc. sells appliances and currently has an after-tax cost of capital of 12%. They intend to expand their product offering by undertaking an 8 year expansion project. The required after-tax cost of capital on this project is 75% of the company's cost of capital. Junior forecasts that incremental sales from the new product line would increase overall sales by 15%. The expansion would require an initial investment of \$75,000 today. There is a 60% chance that the incremental annual after tax cash flows from the expansion will be \$11,000 and a 40% chance that it will be \$18,500 for the life of the project. Ignoring the impact of depreciation what is the net present value of this project?

- A) -12,177.50
- B) -\$5,453.04
- C) \$2,487.47
- D) \$4,979.00
- E) \$14,110.59

### Solution C

Required return for project =  $12\% \times 0.75 = 9\%$

Expected annual after tax cash flows =  $0.6 \times \$11,000 + 0.4 \times \$18,500 = \$14,000$

NPV =  $-\$75,000 + \text{PV annuity } \$14,000 (9\%,8) = \mathbf{\$2,487.47}$

32. ABC firm is considering a project that will generate after tax cash flows of \$15,000 per year forever beginning in year 1. The project has the same risk as the firm's overall operations and will be financed externally. Equity costs 14% and debt costs 4% on an after-tax basis. The company's tax rate is 23%. The firm's Debt to Equity ratio is 0.8. What is the most the firm can invest in the project today and still earn its required return?

- A) \$107,143
- B) \$157,233
- C) \$166,667
- D) \$187,500
- E) \$199,654

### Solution

WACC =  $0.8/1.8 \times 4\% + 1/1.8 \times 14\% = 0.0954 (9.54\%)$

NPV = 0 = PV of perpetuity discounted at 9.54%

$\$15,000 / 0.0954 = \mathbf{\$157,232.70}$

### Conceptual Questions

33. Stock prices are said to follow a "random walk," which means that if a stock's price declined yesterday, then

- A) today's price will reverse yesterday's loss and go up.
- B) today's price will continue yesterday's decline.
- C) today's price will be unchanged.
- D) today's price will change in either direction with equal likelihood.
- E) Only technical analysts can predict today's price.

### Solution D

34. Which of the following are included in current market prices if the market is semi-strong efficient?

- A) All historical price information
- B) All insider information
- C) All public information
- D) Both A) and C)
- E) Both A) and B)

### Solution D

35. Soft capital rationing is:

- A) A method for a company to restrain the tendency of division heads to overstate the profitability of their projects in order to gain resources;
- B) A method for a company to assign projects when the banks refuse to lend enough money for all good projects;
- C) A response to slow growth in the economy;
- D) Only A and B are true
- E) A, B and C are true.

**Solution A**

Soft rationing is an internal choice not dictated by external events. It can help overcome risk of internal misbehavior. Bank restrictions on loans are hard rationing.

36. Internal rate of return will give the same ranking of the desirability of projects as the net present value rule unless:

- A) The annual net cash flow changes signs more than once;
- B) You can accept any combination of the projects because none of them are mutually exclusive;
- C) The internal rate of return places too high a value on later cash flows relative to early cash flows.
- D) Only A and B are true;
- E) Only A and C are true.

**Solution A**

Answer A -Sign changes give multiple solutions, which is a meaningless situation.  
Answer B is reversed – if projects are mutually exclusive, then IRR may not work.  
IRR is a DCF and hence treats cash flows at different times correctly.

37. In capital budgeting analysis, changes in net working capital are *usually* shown as:

- A) A cash inflow at the beginning of the project.
- B) A cash outflow at the beginning of the project and an equal cash inflow at the end of the project.
- C) A cash inflow at the beginning of the project and an equal cash outflow at the end of the project.
- D) A decrease in the initial amount invested.
- E) None of the above. Changes in net working capital are never included.

**Solution B**

38. A firm is considering investing in a project whose risk is greater than the current risk of the firm, based on any method for assessing risk. In evaluating this project, the decision maker should

- A) Increase the IRR of the asset to reflect the greater risk.
- B) Increase the NPV of the asset to reflect the greater risk.
- C) Reject the asset, since its acceptance would increase the firm's risk.

- D) Multiply the firm's WACC by the it's beta to compute a new risk-adjusted discount rate
- E) Increase the cost of capital used to evaluate the project to reflect the project's higher risk.

### **Solution E**

39. The EAC method for evaluating projects can be used when which of the following project characteristics exist?

- I. The projects are mutually exclusive.
- II. The projects have different economic lives.
- III. The projects will be replaced.

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

### **Solution E**

40. If the corporate tax rate were to increase, one would expect a firm's depreciation tax shield to be which of the following, all else the same?

- A) More valuable.
- B) Less valuable.
- C) Unchanged, since depreciation doesn't change.
- D) Unchanged, because changes in tax rates don't matter once a project is in place.
- E) It is impossible to tell how it will change, if at all, without more information.

### **Solution A**

41. In making capital budgeting decisions, which of the following statements regarding cash flow is correct?

- A) Cash flow measures changes in the firm's bank account.
- B) Cash flow should be recognized only when it has accrued according to GAAP practices.
- C) Cash flows should be valued on a pre-tax basis for consistency's sake.
- D) After-tax cash flow is usually identical to accounting profits when accrual accounting is used.
- E) Incremental cash flows should include opportunity costs but ignore sunk costs.

### **Solution E**

42. The process in which a business allocates a certain amount of financing for capital spending to each business unit is called:

- A) Soft rationing.
- B) Hard rationing.
- C) Capital rationing.

- D) Sensitivity allocation.
- E) Incremental allocation.

### **Solution E**

43. Which of the following statements regarding NPV analysis is correct?

- A) NPV calculations do not depend critically on cash flow projections.
- B) NPV calculations are only as good as the information that goes into the calculations.
- C) Negative NPV projects should be scrutinized to make sure there is a sound economic basis underlying them.
- D) Positive NPV projects that have relatively low levels of fixed costs should be more heavily scrutinized than projects with relatively high levels of fixed costs.
- E) NPV calculations will lead to correct decision-making even if the wrong discount rate is used.

### **Solution B**

44. You have put together a set of cash flow forecasts for a project and have found, on your first calculation, that the NPV is positive. You should:

- I. Accept the project because you are certain to increase shareholder wealth.
- II. Try to identify some source of value in the project.
- III. Use scenario or sensitivity analysis to investigate the project in greater detail.
- IV. Try to assess the degree of forecasting risk that exists with the project.

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

### **Solution D**

45. The standard deviation of a portfolio of 2 stocks is

- A) The portfolio weighted average of the standard deviations of the individual stocks within the portfolio.
- B) Portfolio weighted average of the standard deviations of the individual stocks within the portfolio only if the 2 stocks are perfectly correlated.
- C) The portfolio weighted average of the standard deviations of the individual stocks within the portfolio if the 2 stocks are perfectly uncorrelated.
- D) The portfolio weighted average of the standard deviations of the individual stocks within the portfolio if the 2 stocks have a perfect negative correlation.
- E) None of the above.

**Solution B**

If rho is zero the whole third term under the square root disappears and what is left is not a perfect square. If rho is one, then what is left under the square root is a perfect square in the form of

$$(a+b)^2 = a^2 + b^2 + 2ab$$

46. Which of the following statements is (are) true concerning risk and return?

- I. To accept higher levels of risk, investors must be paid a higher risk premium.
- II. Smaller company stocks generally offer a higher return and less risk than larger company stocks.
- III. The risk free rate of return is based on the long term government bond rate.
- IV. The higher the standard deviation of a security, the less predictable the rate of return in any one year.

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

**Solution E**

47. Which of the following are examples of systematic risk?

- I. An increase in the growth rate of Gross Domestic Product
- II. A decrease in the productivity of a company's workers
- III. A decrease in the rate of inflation.
- IV. A decrease in a firm's cost of borrowing

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

**Solution B**

48. The steeper the slope of the security market line, the:

- A) Higher the risk free rate of return.
- B) Lower the risk free rate of return.
- C) Higher the market beta.
- D) Higher the market risk premium.
- E) Lower the market rate of return.

**Solution D**

49. Which one of the following is a correct statement concerning the weighted average cost of capital (WACC)?

- A) Preferred stock is generally the cheapest form of external financing.
- B) An increase in interest rates by the Bank of Canada generally has no effect on a firm's cost of capital.
- C) The use of debt generally lowers a firm's cost of capital, at least initially.
- D) Taxes help lower the cost of debt and preferred stock financing.
- E) Over time the weighted average cost of capital remains constant for a firm.

**Solution C**

50. Which one of the following statements is incorrect concerning the weighted average cost of capital (WACC)?

- A) The after tax yield to maturity on bonds is relevant to the computation of the WACC.
- B) When computing the WACC, the weight assigned to the preferred stock is the market value of the preferred stock relative to the market value of the assets.
- C) A firm's WACC will increase as their corporate tax rate decreases.
- D) The value of common stock used in the computation of the WACC is based on the number of shares outstanding multiplied by the market value per share.
- E) For WACC calculation the weight of the debt can be calculated as the market value of the bonds outstanding multiplied by the quoted price relative to the market value of the assets.

**Solution E**