

SAPR cup months

1. You just won the lottery! As your prize you will receive \$1,200 a month for 100 months. If you can earn 8% on your money, what is this prize worth to you today?

- A. \$87,003.69
- B. \$87,380.23
- C. \$87,962.77
- D. \$88,104.26
- E. \$90,723.76

$$1200 \left[\frac{1}{.0066} - \frac{1}{.0066(1.0066)^{100}} \right]$$

~~87,003.69~~ = 87,380.23

2. Which of the following are examples of erosion?

- (I) the loss of sales due to increased competition in the product market
 - (II) the loss of sales because your chief competitor just opened a store across the street from your store
 - (III) the loss of sales due to a new product which you recently introduced
 - (IV) the loss of sales due to a new product recently introduced by your competitor
- A. III only
 - B. III and IV only
 - C. I, III and IV only
 - D. II and IV only
 - E. I, II, III, and IV

3. Consider a bond with a face value of \$1000 which pays 7% semiannually and has 8 years to maturity. The market requires an interest rate of 8% SAIR compounded semi-annually on bonds of this risk. What is this bond's price?
- A. \$ 942.50
 B. \$ 911.52
 C. \$ 941.74
 D. \$1,064.81
 E. None of the above.

$$P = 35 \left[\frac{1}{0.04} - \frac{1}{0.04(1.04)^{16}} \right] + \frac{1000}{(1.04)^{16}} = 941.74$$

407.83 + 533.91

4. The internal rate of return (IRR):
- ✓ ~~(I)~~ rule states that a typical investment project ($C_0 < 0$) with an IRR that is less than the required rate should be accepted.
 - ✓ ~~(II)~~ is the rate generated solely by the cash flows of an investment.
 - ✓ ~~(III)~~ is the rate that causes the net present value of a project to exactly equal zero.
 - ~~(IV)~~ can effectively be used to analyze all investment scenarios.
- A. I and IV only
 B. II and III only
 C. I, II, and III only
 D. II, III, and IV only
 E. I, II, III, and IV

5. You are examining the following two projects:

IR: ?
4% 10%.

	Year 0	Year 1	Year 2	Year 3	Year 4
Project A	-\$400	+\$100	+\$200	+\$400	+100
Project B	-\$500	+\$300	+\$600		

- What is the NPV of both projects?
- What is the Profitability index of both projects?
- What is the Payback Period of both projects?
- What is the Discounted Payback Period of both projects?
- What is the Internal Rate of Return for **Project B**?

a) A: $-400 + 90.91 + 165.29 + 300.53 + 68.30 = 225.03$

B: $-500 + 272.72 + 495.87 = 268.595$

b) A: $\frac{625.03}{460} = 1.56$ B: $\frac{768.595}{500} = 1.54$

c) A: 3 years B: 2 years

d) A: 3 years B: 2 years

e) $-500 + \frac{300}{1+r} + \frac{600}{1+r^2} = 0 \quad \div 100, \quad r = 1+r, \quad \times r^2$

$$-5r^2 + 3r + 6 = 0$$

$$r = \frac{-3 \pm \sqrt{9 - 4(-5)(6)}}{2 \cdot (-5)} = \frac{-3 - 11.3578}{-10} \Rightarrow 43.58\% = r$$

Throw out -ve IR...

$$r = (1.43578)$$

6. You are trying to decide between two machines, A and B. Each machine will keep being replaced for the foreseeable future. Machine A lasts 5 years, while Machine B's lifetime is only 3 years. Using Equivalent Average Cost, which machine is the better purchase? $iR = 10\%$.

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Machine A	-\$600	-\$100	-\$100	-\$80	-\$80	-\$60
Machine B	-\$450	-\$125	-\$125	-\$100		

$$NPV A = -600 + \frac{100}{1.1} - \frac{100}{1.1^2} - \frac{80}{1.1^3} - \frac{80}{1.1^4} - \frac{60}{1.1^5} = 925.555$$

$$NPV B = -450 - \frac{125}{1.1} - \frac{125}{1.1^2} - \frac{100}{1.1^3} = 742.07$$

$$A: 925.55 = C \left[\frac{1}{.1} - \frac{1}{.1(1.1)^5} \right] \Rightarrow C = 244.16$$

~ 3.79

$$B: 742.07 = C \left[\frac{1}{.1} - \frac{1}{.1(1.1)^3} \right] \Rightarrow C = 298.397$$

2.4868

choose A.

7. You are looking to purchase a car in 18 months. You will be able to save \$50 per month for the next 18 months (18 total payments starting one month from now, until you graduate) for the down payment. You purchase the car, which costs \$35,000 on the day you make the last \$50 contribution to your car fund. The rest will be financed with monthly payments for 4 years, starting one month after you purchase the car. If you can save and borrow at 5% SAIR compounded monthly, what is the amount of the car payments?

$$PV \ 18 \text{ payments: } 50 \left[\frac{1}{.05/12} - \frac{1}{.05/12(1 + \frac{.05}{12})^{18}} \right] = 865.34$$

17.3069 $12 = \frac{1}{.05/12} \approx 24$

$$FV \ 18 \text{ payments} = 865.34 \times (1 + \frac{.05}{12})^{18} = 932.59$$

$$\text{Financed part: } 35000 - 932.59 = 34067.41$$

$$34067.41 = C \left[\frac{1}{0.05/12} - \frac{1}{.05/12(1 + \frac{0.05}{12})^{48}} \right]$$

= 48

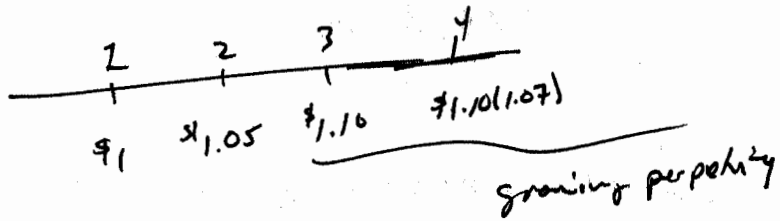
~~1815.77~~

43.42

~~C = 784.55~~

$C = 784.55$

8. A stock will pay a dividend of \$1 in one year, \$1.05 in two years, \$1.10 in three years, and each year thereafter the dividend will increase 7%. If the correct discount rate for the stock is 12%, what is the price of the stock?



$$PV_2 = \frac{1.10}{r-g} = \frac{1.10}{.12 - .07} = 22$$

Timeline diagram showing dividends at years 1 and 2. Year 1: \$1; Year 2: 1.05, 22, 23.05.

$$P_0 = \frac{1}{1.12} + \frac{23.05}{1.12^2} = \frac{18.375}{1.12^2} = \$19.27$$

1. American Fortunes is preparing a bond offering with an 8% coupon rate. The bonds will be repaid in 10 years. The company plans to issue the bonds at par value and pay interest semiannually. The face value of the bond is \$1000. Given this, which of the following statements are correct?

- ✓ (I) The initial selling price of each bond will be \$1,000. ✓
 - ~~(II) After the bonds have been outstanding for 1 year, you should use 9 as the number of compounding periods when calculating the market value of the bond.~~
 - ✓ (III) Each interest payment per bond will be \$40.
 - ✓ (IV) The yield to maturity when the bonds are first issued is 8%.
- A. I and ~~II~~ only
B. ~~II~~ and III only
C. ~~II~~, III, and IV only
D. I, ~~II~~, and III only
E. I, III, and IV only
- Just by eliminating II.*

2. Which of the following are examples of an incremental cash flow?

- ✓ (I) a purchase of a machine necessary for the project
 - ✓ (II) a decrease in net working capital
 - ✓ (III) an increase in taxes
 - ✓ (IV) a decrease in the cost of goods sold
- A. I and III only
B. III and IV only
C. I and IV only
D. I, III, and IV only
E. I, II, III, and IV

3. You are comparing two annuities which offer monthly payments for ten years. Both annuities make a total of 120 payments and are identical with the exception of the payment dates. Annuity A pays on the first of each month while annuity B pays on the last day of each month. Which one of the following statements is correct concerning these two annuities?
- A. Both annuities are of equal value today.
 - B. Annuity A has a higher future value than annuity B.
 - C. Annuity B has a higher present value than annuity A.
 - D. Both annuities have the same future value as of ten years from today.
4. You have some property for sale and have received two offers. The first offer is for \$189,000 today in cash. The second offer is the payment of \$100,000 today and an additional \$100,000 two years from today. If the applicable discount rate is 8.75%, which offer should you accept and why?
- A. You should accept the \$189,000 today because it has the higher net present value.
 - B. You should accept the \$189,000 today because it has the lower future value.
 - C. You should accept the second offer because you will receive \$200,000 total.
 - D. You should accept the second offer because you will receive an extra \$11,000.
 - E. You should accept the second offer because it has a present value of \$194,555.42.

$$NPV_1 = 189,000$$

$$NPV_2 = 100,000 + \frac{100,000}{(1.0875)^2} = 194,555$$

$$\Delta NPV = +444 \text{ for accepting } 1$$

5. You are examining two projects with the following cash flows:

	Year 0	Year 1	Year 2
Project A	-\$260	+\$270	+\$100
Project B	-\$500	+\$300	+\$350

The correct discount rate for projects of this risk is 12%.

- What is the NPV of both projects?
- What is the Profitability index of both projects?
- What is the Payback Period of both projects?
- If the projects are mutually exclusive, use incremental IRR to choose between the projects.

$$a). A: -260 + \frac{270}{1.12} + \frac{100}{1.12^2} = -260 + 241.07 + 79.72 = 60.79$$

$$B: -500 + \frac{300}{1.12} + \frac{350}{1.12} = -500 + 267.86 + 279.02 = 46.88$$

$$b). A: \frac{241.07 + 79.72}{260} = 1.234$$

$$B: \frac{267.86 + 279.02}{500} = 1.094$$

$$c). A: 1 \text{ year}$$

$$B: 2 \text{ years}$$

$$D: \text{Free payments: } -240 \quad +30 \quad +250$$

$$\frac{-240}{1} + \frac{30}{1+r} + \frac{250}{(1+r)^2} = 0 \quad q = 1+r$$

$$xq^2: -240q^2 + 30q + 250 = 0$$

$$q = \frac{-30 \pm \sqrt{(30)^2 - 4(-240)(250)}}{2(-240)} = \frac{-30 \pm 490.8156}{-480}$$

$$\text{take the soln; } 1.085$$

IRR = 8.5%. Investment, $r > \text{IRR}$ so reject expansion to B.

6. Deceptor Sports has decided to sell a new line of freestyle snowboards. The line of snowboards will be sold for the next three years and sales are shown in the table. Variable costs are 60% of sales. New production equipment is required and cost \$10.5 million. The equipment will have no salvage value and be straight line depreciated over three years. Net working capital will need to be increased by \$750,000 immediately and will be recovered at the end of the project. The new snowboards will erode sales of current lines, but it will increase sales of the firm's line of boots. The changes in profit for the other two products are also shown in the table. The firm faces a tax rate of 35%. Calculate the NPV of the project if the appropriate discount rate is 15%.

price per pair

	Sales (in millions)	Erosion of Boards (in millions)	Increase of Boot Profit (in millions)
Year 1	\$30	\$10	\$6
Year 2	\$35	\$10	\$8
Year 3	\$25	\$5	\$4

	Year 0	Year 1	Year 2	Year 3
Sales Rev.		<u>30</u>	<u>35</u>	<u>25</u>
costs		<u>-18</u>	<u>-21</u>	<u>-15</u>
Equip.	<u>-10.5</u>			
Dep:		3.5	3.5	3.5
Tax Shield		<u>1.225</u>	<u>1.225</u>	<u>1.225</u>
NWC	<u>-.75</u>			<u>+.75</u>
Taxes:		<u>-4.2</u>	<u>-4.9</u>	<u>-3.5</u>
Change in Boards		<u>-10</u>	<u>-10</u>	<u>-5</u>
change in Boots		<u>+6</u>	<u>+8</u>	<u>+4</u>
Cash Flow	-11.25	5.025	8.325	7.475

NPV = $-11.25 + \frac{5.025}{1.15} + \frac{8.325}{1.15^2} + \frac{7.475}{1.15^3} = 4.33$ million

7. You're trying to save money for your retirement, and you choose to invest in CDs. Your first deposit of \$2000 is in a year, and you make a total of 30 such yearly deposits. Your tax bracket is 35%. If the interest rate is 7% SAIR compounded monthly, how much money will you have when you make your final investment in 30 years?

$$\text{EMR: } (1.07)^{12} - 1 = 7.23\% \text{ pretax} \quad \text{post-tax: } 2.53\%$$

$$\text{PV: } 2000 \left[\frac{1}{0.0253} - \frac{1}{(0.0253)(1.0253)^{30}} \right] \frac{(1+0.0253)^{30}}{2.116}$$

$$= 788226.37$$

8. Suppose a stock is a cash cow and providing a return of \$3.15 in dividends per year. It has 2 million shares outstanding, and its most recent dividend has just been paid.

- If the stock is currently trading at \$45, what is the discount rate for this stock?
- If the company finds a project that will cost \$5 million immediately but return \$2 million in perpetuity, what is the new stock price?

$$a) \quad 45 = \frac{3.15}{r}$$

$$r = 3.15/45 = 7\%$$

~~Start~~ The first part is in 1 year.

$$b) \quad NPVGO: \quad -5 + \frac{2}{.07} = 23.57$$

$$\Delta P = \frac{23.57}{2} = 11.78$$

$$\text{stock price} = 45 + 11.78 = 56.79.$$