Multiple Choice Questions (3 points each)

1. The highest effective annual rate that can be derived from an annual percentage rate of 12% is:
A. $(1+12\%/2)^2-1$
B. $(1+12\%/4)^4-1$
C. $(1+12\%/12)^{12}-1$
D. More than what is given in C
E. Less tan what is given in B

The highest effective rate for APR 12% is $e^{.12}-1$.

2. Which one of the following statements is correct concerning the payback period?
A. An investment is acceptable if its calculated payback period is less than some pre-specified period of time.
B. An investment should be accepted if the payback is positive and rejected if it is negative.
C. An investment should be rejected if the payback is positive and accepted if it is negative.
D. An investment is acceptable if its calculated payback period is greater than some pre-specified period of time.
E. An investment should be accepted any time the payback period is less than the discounted payback period, given a positive discount rate.

3. All else constant, a bond that is selling at a premium, must have:
A. a coupon rate that is equal to the yield to maturity.
B. a market price that is less than par value.
C. semi-annual interest payments.
D. a yield to maturity that is less than the coupon rate.
E. a coupon rate that is less than the yield to maturity.

4. A project has an accounting break-even quantity of 2,000 units. The fixed costs are $4,200 and the depreciation expense is $400. The projected variable cost per unit is $23.10. What is the projected sales price?
A. $20.80
B. $21.00
C. $21.20
D. $25.40
E. $25.60

Accounting break-even Q = 2,000 = ($4,200 + $400) ÷ (P - $23.10); P = $25.40

5. In calculating the accounting break-even quantity, tax is not taken into account because:
A. Tax is not a part of Operating Income and Costs
B. Tax is not a part of EBIT
C. Taxes can be deferred to future years
D. There is no tax due
E. None of the above

6. Toprak's Kites has net income of $240 and total equity of $2,000. The debt-equity ratio is 1.0 and the dividend payout ratio is 60%. What is the maximum rate at which Toprak can grow using only its internal funds?
A. 2.46%
B. 3.00%
C. 4.92%
D. 5.88%
E. 6.00%

Total assets = $2,000 + $2,000 = $4,000 (The debt-equity ratio of 1.0 means TD = TE.); Return on assets = $240 ÷ $4,000 = .06;
Internal growth = [.06 × .40] ÷ [1 - (.06 × .40)] = 2.46%

7. A cost that has already been paid, or the liability to pay has already been incurred, is a(n):
A. salvage value expense.
B. net working capital expense.
C. sunk cost.
D. opportunity cost.
E. erosion cost.

8. Wilbert's, Inc. paid $90,000, in cash, for a piece of equipment three years ago. Last year, the company spent $10,000 to update the equipment with the latest technology. The company no longer uses this equipment in its current operations and has received an offer of $50,000 from a firm who would like to purchase it. Wilbert's is debating whether to sell the equipment or to expand its operations such that the equipment can be used. When evaluating the expansion option, what value, if any, should Wilbert's assign to this equipment as an initial cost of the project?
A. $40,000
B. $50,000
C. $60,000
D. $80,000
E. $90,000

9. A project will increase sales by $60,000 and cash expenses by $51,000 annually. The project will cost $40,000 and will be depreciated using straight-line depreciation to a zero-book-value over the 4-year life of the project. The company has a tax rate of 35%. What is the annual operating cash flow of the project?
A. $5,850
B. $8,650
C. $9,350
D. $9,700
E. $10,350

OCF = [($60,000 - $51,000) × (1 - .35)] + [($40,000 ÷ 4) × .35] = $9,350

10. Consider two projects with the following cash flow:

Year	Project A	Project B
1	800	960
2	820	900
3	900	820
4	960	800

Which of the following is true concerning these two projects?

A. At 10% per year, both Projects have cash flow equivalent to an annuity that gives 880 per year.
B. Given a positive interest rate, the future value of Project B is higher than that of Project A.
C. If the payback period method rejects Project A, it would also reject Project B.
D. If the payback period method accepts Project B, it would also accept Project A.
E. Given a positive interest rate, the future value of Project B is higher than Project A but the present value of Project A is higher than Project B.

11. At the financial break-even point of a project,

a) payback period must be less than the length of the project.
b) your return on the project is exactly the same as your best alternative.
c) you cover all of your costs except your opportunity cost.
d) A and B are correct.
e) A, B, and C are correct.

12. You calculate the profitability index of B-A and choose B. Then, you know for sure that

    a) A's profitability index is less than 1.
    b) B's profitability index is less than 1.
    c) A' profitability index is greater than 1.
    d) B's profitability index is greater than 1.
    e) <u>None of the above.</u>

Solution: The fact that B is chosen over A does not guarantee that B is better than market. For example:

Project	A	B	B-A
Initial Cost	100	110	10
Year 1	50	55	5
Year 2	52	60	8
NPV @ 10%	-11.57	-10.41	1.15

Numeric Problems:

1. (12 points)
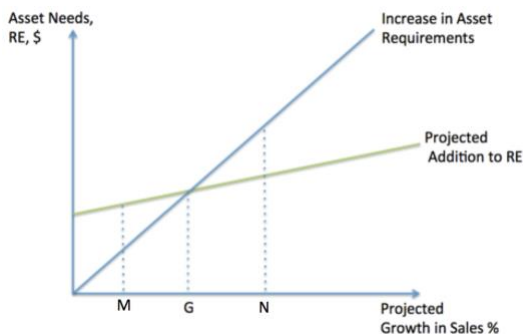
In the above diagram, Berin Inc.'s asset increase requirements (with spontaneous liabilities netted out) in relation to its projected addition to retained earnings are given at each projected growth rate. Berin is funded 50% by Equity and 50% by Debt. Financial objective: No new stocks will be issued. Dividend payout ratio will stay the same

    a. If the planned growth rate for next year is N, is it possible for Berin to have a lower D/E ratio next year compared to this year?

       Yes. If the SGR is greater than N.

    b. If planned growth rate is less than M, is it possible for Berin to keep its D/E ratio next year the same as this year?

       No! Since Debt is not zero, internal growth rate (G in the diagram) must be less than sustainable growth rate. Then, D/E cannot be kept as before at a growth rate less than G.

    c. When sales grow by 20%, the firm has a positive projected EFN. Do you know with certainty if the sustainable growth rate is greater than or less than 20%?

       No! We do not know if D/E is the same, less than or more than 20%.

2. (12 points) In US, any return obtained from bonds issued by a state government is not taxed but a bond issued by a corporation is taxed at 15%. That is, each time you collect a coupon, you pay 15% as tax and when you sell the bond you pay 15% on the **profit** you make.

A corporate and a state bond, issued today, each has two-year maturity, face value of $1,000, and a coupon rate of 8%. If the state bond is selling for $940 today, what is the price of the corporate bond? (quadratic formula: $\frac{-b\pm\sqrt{b^2-4ac}}{2a}$)

State Bond:
$940 = 80/(1+r) + 1080/(1+r)^2$
r=11.53%

Corporate Bond:

Let p denote the corporate bond price today.

$p = 80(1-15\%)/1.1153 + 80(1-15\%)/1.1153^2 + 1000/1.1153^2 - 0.15 (1,000-p)/1.1153^2$
p= 908

Note that, this is not the same price that would be obtained by

$p = (80/1.1153 + 1080/ 1.1153^2) (1-15\%)$
p = 798.98

3. (12 points) Two years ago, Company X issued a 10-year bond with 10% coupon rate and $1000 face value and made its second coupon payment today. Market rate is currently 6%.

Financial Manager of Company X offers the following plan to the board or directors:
 Call back (buy back) all its bonds to issue new ones to take advantage of the lower market rate at a price of $1,250 per bond.

You are one of the board members. Would you agree with this plan?

Solution: Value of the bonds to call at @6% is $100 A^8{}_{6\%} +1000/(1.06)^8 = \$1,248.39$.*

The bonds are valued significantly above the face value. Company would be indifferent paying a premium price for the existing bonds only to issue bonds at 6% coupon. Issuing a 6% percent coupon bond is better than having to make payments of an already existing 10% coupon bond. However, premium price makes up for the difference, leaving the company with no benefit. Therefore, unless the company can buy back the bonds at a lower price, this policy is not worth undertaking.

4. (14 points) Walter White Inc. has the following cost information on its new project.

Equipment: $700 (good for 5 years)
Annual Fixed cost: $200 per year
Per Unit Variable cost: $3 per unit
Discount rate: 12%
Quantity that will be produced and sold (per year): 85
Tax rate: 34%

a) What is <u>the financial break-even price</u>?

Financial Break-Even = (EAC+Fixed Costs(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t)
We need to calculate EAC: Annuity with 5 years, 12%, and present value of $700.
$700 = (A/0.12)*(1-1/1.12^5)$, then, A=$194.19
*Financial Break-Even = (194.19+200(1-0.34)-0.34*140)/(P-3)(1-0.34) = 85*
Solve for P= 7.96

b) If the variable cost were to go up by 10%, what is the percentage increase needed in price for Walter White to financially break even?

<u>1st Method:</u> Find the new financial break-even point with the new variable cost.

Financial Break-Even = (194.19+200(1-0.34)-0.34*140)/(P-3.3)(1-0.34) = 85
Solve for P= 8.26

2nd Method: Take the derivative of Financial Break-Even price with respect to variable cost:

Price = {(EAC+Fixed Costs(1-t)-t Depr.)/ Q(1-t)} + Variable Cost

$$\frac{\partial Price}{\partial VariableCost} = 1$$

Then, the increase in variable cost will be directly reflected in the price by the same amount. A 10% increase in variable cost is 0.3. This is also equal to the change in price:
7.96+.3 = 8.26

5. (14 points) A computer chip manufacturer is planning a new 5-year expansion project. It already paid $200K to a company for market research. The project will require an initial fixed asset investment of $4 million. That asset will be depreciated using the straight-line method (i.e. equally) over the 5 years with no salvage value.

The expansion should produce $5,000,000 in annual sales and $2,000,000(fixed and variable) of annual expenses during that time. The company's tax rate is 40%, and the market rate is 12%.

   a.   What is the project's NPV? Should the company undertake the expansion project?

   $200K is a sunk cost and should not be included in the calculations.
   OCF: Operating Cash Flow

   NPV = Initial Investment + PV(OCF) = -4,000,000+ $OCF_1/(1+r)^1$ + $OCF_2/(1+r)^2$ + $OCF_3/(1+r)^3$ + $OCF_4/(1+r)^4$ + $OCF_5/(1+r)^5$ =$3,642,126, Yes, undertake the project.

   OCF can be calculated in one of the following three ways, all acceptable:

   OCF = Sales-Cash Costs-Taxes = 5,000,000-2,000,000-[(3,000,000-800,000)*.4]=2,120,000

   OCF = Net Income + Depreciation = (Sales-Cash Costs-Depreciation)(1-Taxes)+Depreciation

   OCF = (Sales-Cash Costs)(1-Taxes)+Depreciation * Taxes

   b. What is the financial break-even quantity if price per unit is $50 and variable cost per unit is $10?

   If revenue is $5,000,000 when price per unit is $50, Q=100,000. Since VC=$10, at Q=100,000, Fixed Cost per year should be $2,000,000-$10*100,000 = $1,000,000. Since Fixed Cost does not depend on Q, it will be the same regardless of the amount of Q.

   Let's denote the financial break-even quantity by Q_F.

   $(50Q_F - 10Q_F - 1,000,000 - 800,000)(1-0.4) - (1,109,639 - 800,000) = 0$
   where 1,109,630 is per year annuity amount of a present value of $4million at 12% for 5 years

   $4,000,000 = (EAC / 0.12) (1-1/1.12^5)$ which gives EAC=1,109,639

   $Q_F = 57,901.6$

   c. What is the sensitivity of NPV to per unit price? (Hint: Would the NPV change by the same amount if price changes by 1 unit regardless of what Q is?)

   $\delta NPV/\delta P = 0.6Q (1/(1+r)^1 + 1/(1+r)^2 + 1/(1+r)^3 + 1/(1+r)^4 + 1/(1+r)^5)$
   Derivative of NPV with respect to P depends on Q.

Market Value Measures	Market Capitalization = Price per share * # Shares Outstanding P/E Ratio = Price Per Share / Earnings Per Share Market to Book Ratio = Market Value per Share / Book Value per Share
External Financing Formulas	$$EFN = \left(\frac{\text{Assets}}{\text{Sales}}\right) \times \Delta\text{Sales} - \frac{\text{Spon Liab}}{\text{Sales}} \times \Delta\text{Sales} - (PM \times \text{Projected Sales}) \times (1-d)$$ $$\text{Internal Growth Rate} = \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \qquad \text{Sustainable GrowthRate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b}$$
Present Value Formulas	$$FV = C_0 \times \left(1 + \frac{r}{m}\right)^{m \times T} \qquad FV = C_0 e^{rT} \qquad PV = C/r \qquad PV = \frac{C}{r-g}$$ $$PV = \frac{C}{r}\left[1 - \frac{1}{(1+r)^T}\right] \qquad PV = \frac{C}{r-g}\left[1 - \left(\frac{1+g}{(1+r)}\right)^T\right]$$
Accounting Ratios	Current Ratio = Current Assets/ Current Liabilities Quick Ratio = (Current Assets – Inventory) / Current Liabilities Cash Ratio = Cash / Current Liabilities Total Debt Ratio = (Total Assets – Total Equity) / Total Assets Debt/Equity = Total Debt / Total Equities Equity Multiplier = Total Assets / Total Equity Times Interest Earned = (Earnings Before Interest And Taxes) / Interest Cash Coverage = (EBIT + Depreciation + Amortization) / Interest Inventory Turnover = Cost of Goods Sold / Inventory Days' Sales in Inventory = 365 / (Inventory Turnover) Receivables Turnover = Sales / Accounts Receivable Days' Sales in Receivables = 365 / Receivables Turnover Total Asset Turnover = Sales /Total Assets Profit Margin = Net Income / Sales Return on Assets = Net Income / Total Assets Return on Equity = Net Income / Total Equity
Financial Cash Flow, Break Even Point, OCF Formulas, Salvage Value	C(A)=C(B)+C(S) C(A) =OCF- Change in NWC – Cash Flow to Fixed Assets OCF=EBIT+Depreciation-Tax Change in NWC = Ending NWC – Beginning NWC Cash Flow to Fixed Assets = Ending NFA-Beginning NFA+Depreciation (if we use the gross fixed assets, then = Ending Gross Fixed Assets – Beginning Gross Fixed Assets) C(B) = Interest-(Ending Long Term Debt – Beginning Long Term Debt) C(S) = Dividends – (Stocks sold- Stocks purchased) Accounting: (Fixed Costs+Depr.)/(Sales Price-Variable Cost) Financial(Pres. Value): (EAC+Fixed Costs*(1-t) – t*Depr.) / (Sales Price-Var. Cost)*(1-t) Top Down: OCF = Sales-Cash Costs-Taxes, Bottom up: OCF = Net Income+Depreciation Tax Shield: OCF = (Sales-Cash Costs)*(1-t)+t*Dep. Salvage Value = Market Value - t (Market Value-Book Value)
Bond Value	$$\text{Bond Value} = C\left[\frac{1 - \frac{1}{(1+r)^T}}{r}\right] + \frac{F}{(1+r)^T}$$