TOPICS

Questions on topics that are not covered this quarter are crossed out!

Multiple Choice Questions (3 points each)

1. ~~In project evaluation, which of the following is an advantage of using Internal Rate of Return (IRR) over NPV and other project evaluation methods?~~

a) IRR is easy to calculate
b) <u>IRR is a single number summarizing the return of a project without needing any reference to the market rate.</u>
c) IRR takes all the relevant cash flow into account
d) IRR takes the time value of money into account
e) IRR can never be zero

2. The length of time required for an investment to generate cash flows sufficient to recover the initial cost of the investment is called the:

a) Net Present Value
b) Discounted Cash Flow
c) Internal Rate of Return
d) <u>Payback Period</u>
e) Profitability Index

3. The major disadvantage of forming a business as a corporation is:

a) having to change owners due to unlimited life of a corporation
b) Having shareholders
c) Having to issue bonds
d) <u>Double taxation</u>
e) Having high leverage compared to a sole proprietorship

4. Which of the following is <u>not</u> correct about the common-size financial statements:

a) They are used to compare the financials of a company over time.
b) They are used to compare the financials of different-size companies operating in the same industry.
c) <u>They are also called the pro-forma statements.</u>
d) Common-size Balance Sheet expresses every account as a percentage of assets.
e) Common-size Income Statement expresses every account as a percentage of sales.

5. Which of the following is <u>not</u> correct concerning the Rating Agencies:

a) They rate the corporate bonds.
b) <u>They rate the corporate stocks</u>.
c) They provide information that would help to evaluate the default risk of companies.
d) They suffer from a conflict of interest since they are funded by the same companies that they evaluate.
e) They rate local and federal government bonds.

6. A project has the following cash flow:

Years	0	1	2	3
Cash Flow	-$4,973.70	$2,000	$2,000	$2,000

Which of the following is the Internal Rate of Return (IRR) of this project:

a) 5%
b) 8%
c) 10%
d) 12%
e) 14%

7. Discounted payback period is

a) longer than payback period for any project as long as the discount rate is positive.
b) shorter than payback period for any project as long as the discount rate is positive.
c) longer than payback period for any project as long as the discount rate is zero.
d) shorter than payback period for any project as long as the discount rate is zero.
e) none of the above

8. For a premium bond, current yield is always

a) equal to the coupon rate
b) more than Yield to Maturity
c) less than Yield to Maturity
d) equal to Yield to Maturity
e) none of the above

9. If you would like to estimate what your average return of an asset at a given period in the future will be, it is better to use:

a) standard deviation
b) geometric average
c) holding period return
d) arithmetic average
e) variance

10. A 30-year bond, compared to a 1-year bond:

a) has a lower inflation risk
b) has a higher interest rate risk
c) has a higher default risk
d) has a higher liquidity risk
e) has a lower liquidity risk

Short Answer Questions (3 points each)

11. You invested in a portfolio with 30% expected return with 35% standard deviation. What is the approximate probability that your money will double or more next year given that the returns are normally distributed?

Initial investment will double when the realized return is 100%. In this case, the realized return of the portfolio will fall within the range of [30% - 2(35%),30% + 2(35%)] = (-100%,+100%] with 95% probability. Then, the return will be at least 100% with (1-.95)/2 probability=2.5%. (more fine-tuned answer: (1-95.44)/2=2.28%)

12. a) Draw the Yield Curve for US Treasuries. What kind of a shape does it have? Be sure to label both axes. You do not need to show units.
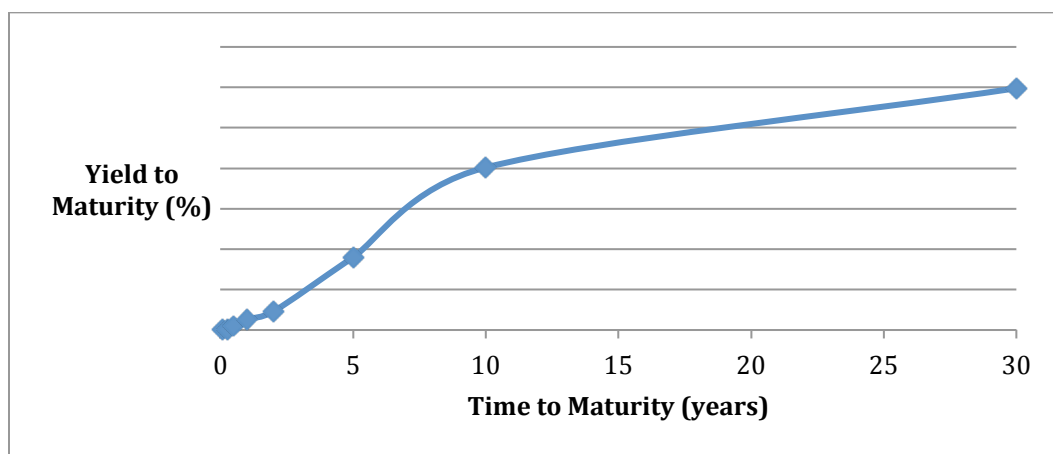
Accept it as correct as long as the slope is positive.

b) What does an "inverted yield curve" mean and what does it signify?

Inverted yield curve refers to a case where short term rates are higher than long term rates, that is the Yield Curve has negative slope.

Data shows that, this can be a leading indicator of recession. Thus far is enough to get full points.

As people's expectations of the economy worsens, they expect that they will not be able get high returns in the future, then, they sell short term bonds and buy long term bonds (by locking their money to high rates now). The price of short term bonds go down, increasing their yield and the price of long term bonds go up decreasing their yield, creating a negatively sloped yield curve.

13. Is the following statement TRUE or FALSE and WHY?
"Managers should not focus on the current stock value because doing so will lead to an overemphasis on short-term profits at the expense of long-term profits."

False. Current stock price involves all the relevant information about a company, both short term and long term. The long-term prospects of the company will be integrated into the price now. Thus far is enough to get full points. For instance, if the smartphone market is expected to mature in 5 years, today's cellphone stock prices will reflect the fact that, in five years, cellphone company revenues are expected to

go down. Hence, the companies that are preparing for this and working towards increasing their revenue, by improving their devices or venturing into new arenas etc. will be recognized by the market and the stock price will reflect this.)

14. Is the following statement TRUE or FALSE and WHY?

"A zero coupon bond (a bond that is sold at a discount and pays only the face value at the maturity date) minimizes the interest rate risk."

False. A zero coupon bond delivers all of its cash flow at the end of its lifetime, exposing itself to interest rate fluctuations more, compared to a bond that makes coupon payments periodically and delivers at least some of the the return earlier.

15. Under which circumstance(s) the accounting and financial break-even points will be the same?

When the interest(discount) rate is zero.

16. A century bond was offered by Bell-South in 1995 with a maturity date of 2095 and a face value of $1,000 that makes coupon payments at the end of each year.

Issue Date	Maturity Date	Coupon Rate	1995 Price	1996 Price	2007 Price
1995	2095	5%	$1,000	$800	$1020.29

a) What can you tell about the interest rate in the market in1996? Was it higher or lower than 5%?
Interest rate in the market went up in 1996 compared to 1995. *Thus far is enough to get full points.*
In 1995, the face value and the price are equal to each other at $1,000. Then, it must be the case that the market rate was 5% in 1995. Since the price of the bond went down, this indicates that this bond's coupon rate is lower then market, hence, to compensate for that, it can only be sold at a lower price.

b) If you bought this bond at the beginning of 1996 and sold it at the beginning of 2007, what is your total return?

(1020.29-800+11*50) / 800 = .96 or 96%
(If the student did not give the return in percentage but in dollars, accept it as correct:
1020.29+550-800= $770.29)

c) In 2007, would the Bell South Financial Manager consider recalling these bonds? Why or why not?

Yes. In 2007, the bond becomes a premium bond, indicating that the market rate went down. That is the company is paying a higher percentage than market. Hence, the company may try to recall bonds to reissue new ones with lower coupon rate.

17. You are considering to invest on Project A and/or Project B which have profitability indices of 1.2 and 1.5 respectively. The cash increments of A over B has a profitability index of 0.8. (Assume you do not have a budget constraint.)

    a) If A and B are <u>not</u> mutually exclusive, which project(s) should you take on?

    Since the projects are not mutually exclusive, you can take both as long as they have a profitability index greater than 1. Both A and B have PI>1. Then accept both projects.

    b) If A and B are mutually exclusive, which project(s) should you take on?

    In this case we have to choose one project. We can compare them by inspecting their incremental cash flow. What A offers, as cash flow, over B, has a profitability index of 0.8. Then, accept B and reject A.

18. ~~Your boss gives you the real cash flow and the nominal discount rate for a project and wants you to calculate the net present value of the project. Your colleague thinks you also need the inflation rate, but you think, you do not need it. Who is right and why?~~

I can calculate the NPV, when I have the nominal cash flow and nominal discount rate or real cash flow and real discount rate. In the above case, I will need the inflation rate to convert either the discount rate into real rate or the cash flow into nominal cash flow. So, FRIEND IS RIGHT.

Numeric Questions (5 points each)

19. A Hollywood studio manager is offered the following movie deal: "Super Duper Spiderman" will require an initial investment of $400 million. Manager has the following information on super hero movies: the present value of the box office revenue for such movies is distributed as follows:

Probability	PV of Revenue
0.20	$150 million
0.25	$350 million
0.25	$650 million
0.30	$700 million

What are the expected value and the standard deviation of NPV of Super Duper Spiderman?

Expected Value of the PV of cash flow after initial investment is

0.2*150+0.25*350+0.25*650+0.30*700 = $490 million.

Expected value of NPV = 490-400=$90 million

Standard Deviation of NPV = SQRT [0.20*(150-490)^2+ 0.25*(350-490)^2+ 0.25*(650-490)^2+ 0.30*(700-490)^2] =218.29

[Alternatively, Standard Deviation of NPV = SQRT [0.20*(-250-90)^2+ 0.25*(-50-90)^2+ 0.25*(250-90)^2+ 0.30*(300-90)^2] =218.29

20. You bought a corporate bond one year ago for $943.82. The bond has $1000 face value and 7% coupon rate. These bonds make annual payments and mature six years from now. If you sell your bond today when the discount rate is 8% and if the inflation rate was 4.8% over the past year, what would be your total real return on the investment?

$P_1 = \$70(PVIFA_{8\%,6}) + \$1,000/1.08^6$
$= \$70(1/1.08^1 + 1/1.08^2 + 1/1.08^3 + 1/1.08^4 + 1/1.08^5 + 1/1.08^6) + \$1,000/1.08^6$
$P_1 = \$953.77$

You received the coupon payments on the bond, so the nominal return was:

R = ($953.77 – 943.82 + 70) / $943.82

R = .0847 or 8.47%

And using the Fisher equation to find the real return, we get:

r = (1.0847 / 1.048) – 1
r = .0350 or 3.50%

21. Global Sources is a company producing cell phone screens and it has the unit sale price of $42 and the unit variable cost of $12. The accounting break-even and the financial break-even points of Global Sources are 120,000 units and 140,000 units respectively.
Everything else being constant, if the annual fixed costs increase by $600,000 what would be the new accounting and financial break-even points?

Original Accounting Break-Even =(Fixed Costs+Depr.)/(SalesPrice-Variable Cost) =1,200

New Accounting Break-Even =(Fixed Costs+$600,000+Depr.)/(SalesPrice-Variable Cost)

=(Fixed Costs+Depr.)/(SalesPrice-Variable Cost)+$600,000/($42-$12) =120,000+20,000=140,000 units.

= (EAC+Fixed Costs(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t)

Original Financial Break-Even = (EAC+Fixed Costs(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t) =140,000

New Financial Break-Even (EAC+(Fixed Costs+$600,000)(1-t)-t Depr.)/(SalesPrice-Variable Cost)(1-t) =140,000+20,000=160,000 units

22. Sniurb, Inc. is a young start-up. It is estimated that the company will not be paying any dividends for the coming 8 years as it needs to use its earnings to fuel growth. The company is expected to pay dividends of $4.5 a share at year 9 and will increase the dividends at 5.5% per year thereafter. If the rate that can be applied to such a company is 13%, what is the current stock price?

(As long as the equations are correct, no need for explanation to get the full points)

Here we have a stock that pays no dividends for 8 years. Once the stock begins paying dividends, it will have a constant growth rate of dividends. We can use the constant growth model at that point. It is important to remember that general form of the constant dividend growth formula is:
$P_t = [D_t \times (1 + g)] / (R – g)$
This means that since we will use the dividend in Year 9, we will be finding the stock price in Year 8. The dividend growth model is similar the PV of a perpetuity: The equation gives you the PV one period before the first payment. So, the price of the stock in Year 8 will be:
$P_8 = D_9 / (R – g) = \$4.50 / (.13 – .055) = \$60.00$
The price of the stock today is simply the PV of the stock price in the future. We simply discount the future stock price at the required return. The price of the stock today will be:
$P_0 = \$60.00 / 1.13^8 = \$22.57$

23. 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 of annual expenses during that time. The company's tax rate is 40%, depreciation is tax-deductible, and the discount rate is 12%.

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.

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

Operating Cash Flow (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

24. The Profit Margin, Total Asset Turnover and Equity Multiplier are 9.5%, 0.57, and 1.28 respectively for a company. If the market rate is 7%, would increasing Retention Ratio make an improvement in the stock price of the company?

No. If Return on Equity (ROE) is less than the market rate (the cost of capital) R, then the value of the company and the stock price is expected to go down.

ROE = 0.095*0.57*1.28 = 0.069 = 6.9% < R = 7%.

25. CAFER, Inc. just paid a $12 dividend but the management expects to reduce the payout by 6% per year indefinitely. If the return on comparable firms is 11%, what would you pay for a share today?

Next period's dividend is 12*(1-.06) = 11.28

P = Div / (R-g) = 11.28 / (0.11 – (-0.06)) = 11.28 /.17 = 66.35

26. You invested on a portfolio five years ago. Your holding period return on this portfolio is 34.12% today. What should be the rate of return on the portfolio next year for you to have a 5.2% geometric average annual return on your portfolio over the course of six years?

$(1+R_1)(1+R_2)... (1+R_5) = 1+0.3412$

$[(1+R_1)(1+R_2)... (1+R_5)(1+R_6)]^{1/6}=[1.3412(1+R_6)]^{1/6} =1.052$

$R_6 = 10.65\%$

27. You own Corporation X bonds that have 1 year to maturity, $1,000 face value and 10% coupon rate. The promised yield on this bond is 12% today. However, there is a 5% chance that you will only get half of what is promised from now on. What is the market rate? (hint: remember that the market rate is the rate that your alternative investments offer)

The price of the bond is P = 1,100/1.12 = $982.14
The promised cash flow is $1,100.
*However, the expected cash flow is 1,100 * 0.95 + 550 * 0.05 = $1,072.5*
Then, the expected rate this investment offers should match the market:
$982.14 = 1,072.5/(1+r)
r = 9.2%

28. Assume that risk level is represented by the standard deviation. What is the maximum expected return you can get if you can invest on all the portfolios whose expected returns and standard deviations form the following opportunity set (the line marked by A and B) where P* represents a portfolio and R_f denotes the risk free rate with
$R_f = 2\%$, $E(P^*) = 8\%$, $\sigma_{P*} = 11\%$:
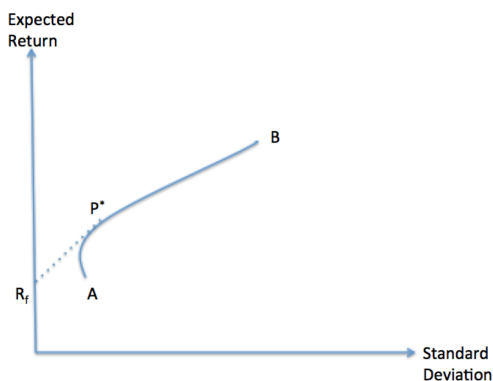
a) If you can bear a risk as much as the optimal portfolio?

From the graph, we can deduce that P* is the optimal portfolio. Then, with a risk level of $\sigma_{P*} = 11\%$, the maximum return we can get is $E(P^*) = 8\%$.

b) If you can bear a risk of $\sigma = 15\%$?

0.15 = X_{P*} σ_{P*}, $X_{P*}=1.36$, that is we should invest 136% on P* and -36% on the risk-free asset. That is we should invest all out money on P*, plus, we should borrow as much as 36% more and invest that on P* as well.
Expected Return = 1.36 * 8% - 0.36 * 2% = 10.16%

(More explanation:

Let F denote the risk-free asset.
We are looking for a portfolio that is composed of P* and the risk-free asset whose variance is $0.15^2 = 0.0225$

$0.0225 = X_{P*}{}^2 \, \sigma_{P*}{}^2 + 2 \, \sigma_{P*} \, \sigma_F \, Cov(P^*,F) + X_F{}^2 \, \sigma_F{}^2$

Here, the second and the third terms on the right hand side are zero.)

c) When would the standard deviation be an inferior representation of the risk level of an asset?

If we hold a well-diversified portfolio (big enough portfolio to eliminate the unsystematic (idiosyncratic) risk, the risk level each asset presents is measured by asset's beta, not by its standard deviation.

29. Stock Z has an expected return of 12%, standard deviation of 54%. If the risk-free rate is 3%, expected market return is 10.86% and the variance of market return is 18%, what is the <u>correlation (ρ)</u> between the returns of stock Z and the market?

Using the CAPM:

0.12 = 0.03 + (beta of Z) (0.1086-0.03)

beta of Z = 1.145

Using the formula

$$\beta_i = \frac{Cov(R_i, R_M)}{\sigma^2(R_M)}$$

1.145 = Cov(Z,M)/.18

Cov(Z,M) = 0.2061

*Corr(Z,M) = 0.2061/ (0.54 * 0.18^{1/2}) = 0.90 (rounded)*

Bonus Question (1 point)

Which rate is considered "the risk-free rate" in US?
3-month Treasury Bill rate

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 Enterprise Value = Market Capitalization + Market Value of Interest Bearing Debts – Cash EV Multiple = EV/ EBIDTA
External Financing Formulas	$$EFN = \left(\frac{\text{Assets}}{\text{Sales}}\right) \times \Delta\text{Sales} - \frac{\text{Spon Liab}}{\text{Sales}} \times \Delta\text{Sales} - (PM \times \text{Projected Sales}) \times (1-d)$$ $$\text{Internal Growth Rate} = \frac{\text{ROA} \times b}{1 - \text{ROA} \times b} \qquad \text{Sustainable Growth Rate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b}$$
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 EBITDA Margin = EBITDA / Sales Capital Intensity = Total Assets / Sales
Break Even Point	Accounting: (Fixed Costs+Depr.)/(Sales Price-Variable Cost) Financial(Pres. Value): (EAC+Fixed Costs*(1-t) – t*Depr.) / (Sales Price-Var. Cost)*(1-t)
Bond Value	$$\text{Bond Value} = C\left[\frac{1 - \frac{1}{(1+r)^T}}{r}\right] + \frac{F}{(1+r)^T}$$
Fisher Formula	(1+Nominal Interest Rate)=(1+Real Interest Rate) * (1+Inflation Rate)

Stock Valuation	Zero Growth: Constant Growth: Differential Growth: $$P_0 = \frac{\text{Div}}{R} \qquad P_0 = \frac{\text{Div}_1}{R-g} \qquad P = \frac{C}{R-g_1}\left[1 - \frac{(1+g_1)^T}{(1+R)^T}\right] + \frac{\left(\frac{\text{Div}_{T+1}}{R-g_2}\right)}{(1+R)^T}$$
Stock Returns	Holding Period Return: Arithmetic Average Return: $$\bar{R} = \frac{(R_1 + \cdots + R_T)}{T}$$ $$HPR = (1+R_1)\times(1+R_2)\times\cdots\times(1+R_T)-1$$ Geometric Average Return: $\sqrt[T]{(1+R_1)(1+R_2)\dots(1+R_T)} - 1$
Sample Statistics	$$\bar{R} = \frac{(R_1 + \cdots + R_T)}{T} \quad SD = \sqrt{VAR} = \sqrt{\frac{(R_1 - \bar{R})^2 + (R_2 - \bar{R})^2 + \cdots (R_T - \bar{R})^2}{T-1}}$$ $$Cov(A,B) = \sigma_{AB} = \sum_i^T (a_i - \bar{a})(b_i - \bar{b})/(T-1)$$ $$Corr(A,B) = \rho_{A,B} = \frac{\sigma_{A,B}}{\sigma_A \sigma_B}$$
General Case	$$E(A) = \sum_i^T p_i a_i \qquad SD(A) = \sigma_A = \sqrt{\sum_i^T p_i(a_i - \bar{a})^2}$$ $$Cov(A,B) = \sigma_{AB} = \sum_i^T p_i(a_i - \bar{a})(b_i - \bar{b})$$
Portfolio Analysis	Expected Return on Portfolio: $$E(r_P) = x_A E(r_A) + x_B E(r_B)$$ Variance of a portfolio: $$\sigma^2 = x_A^2 \sigma_A^2 + 2x_A x_B \sigma_{AB} + x_B^2 \sigma_B^2$$ $$\beta_i = \frac{Cov(R_i, R_M)}{\sigma^2(R_M)}$$