**Mock Midterm**

**Formulas:**

Annuity: . Perpetuity: . Growth perpetuity: .

Summation of Geometric Sequence:

Risk of a portfolio:

**Multiple Choice**

1. When a company is liquidated, which of the following investors has the top priority in claiming the assets over the other two types?

(A) Common stock holders

(B) Preferred stock holders

(C) Bond holders

2. Ant Financial wants to raise capital by issuing stocks. CITIC Securities will take charge of the issuance by matching individual and institutional investors and Ant Financial. CITIC Securities is playing the role of an \_\_\_\_\_\_\_\_\_\_\_\_

(A) Investing sector

(B) Savings sector

(C) Broker

(D) Financial intermediary

3. Standard & Poor’s has assigned an AAA credit rating to Corporation AAA, and it has assigned a BBB credit Rating to Corporation BBB. Holding everything else equal, Corporation AAA has \_\_\_\_\_\_\_ default risk than Corporation BBB. Thus, bond investors will require \_\_\_\_\_\_\_ expected return on their investment in Corporation AAA.

(A) Higher, Higher

(B) Higher, Lower

(C) Lower, Higher

(D) Lower, Lower

4. Which of the following is FALSE?

(A) Holding everything else equal, the price of a long-term bond is more sensitive to changes in the interest rate than the price of a short-term bond is

(B) Holding everything else equal, the price of a stock with a higher required rate of return should be higher than the price of a stock with a lower required rate of return

(C) When a corporation decides to pay out dividends, preferred stock holders take priority over common stock holders

(D) Holding everything else equal, the price sensitivity of a zero-coupon bond is higher than the price-sensitivity of an annual-coupon paying bond when there is a change in the interest rate

5. Which of the following is an example of unsystematic risk?

(A) A sudden cut in the interest rate

(B) A pandemic

(C) A retail store has been robbed

(D) An increase in the oil price

6. You want to make stock investments in WeMade Inc, which is a firm that produces online games, has 2 million common stocks outstanding, and reported 10 million dollars of earnings this year. As you would like to use the relative multiple method to find what should be the stock price of the firm, you came up with the following information after doing some research:

|  |  |
| --- | --- |
|  | Price-to-Earnings ratio |
| Online Game Industry | 2 |
| Food Industry | 0.5 |
| Car Industry | 4 |

What should be the stock price of WeMade?

(A) $2.5/share

(B) $5/share

(C) $10/share

(D) $20/share

EPS = 10M/2M = $5/share

Price = 5\*2 = $10/stock

Note:

Market capitalization = stock price \* number of stocks outstanding = 10\*2 million   
= $20 million

7. Ms. Picture is a chartist. She believes that she has found an amazing trading strategy to make enormous returns, using past price patterns; she thinks that once the past prices indicate a W-shape, the future price would shoot up. Unfortunately, her trading strategy is an epic failure. This is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_

(A) Weak form efficiency

(B) Semi-strong form efficiency

(C) Strong form efficiency

8. The price of a 10-year coupon bond that pays coupons at the rate of 5% annually and has a face value of $1000 has a current price of 1000. What is the yield-to-maturity of the bond?

(A) 4.5%

(B) 5%

(C) 5.5%

(D) 6%

50/0.05\*(1-1/1.05^10)+1000/1.05^10 = 1000

9. Since Charles is a good boy, his mother plans to give him pocket money three times:  
$100 today, $100 a year from today, $100 2 years from today. If the interest rate is equal to 10% per year, which of the following lump-sum amount today is equivalent to receiving the three payments in the future?

(A) $248.69

(B) $273.55

(C) $285.11

(D) $300

100 + 100/1.1 + 100/1.12 = 273.55

10. Stock X has a beta of 0.4 and Stock Y has a beta of 0.8, and these two stocks have a perfectly positive correlation. The excess return on the market portfolio and the risk-free rate are some positive numbers. You want to create a portfolio by putting an equal weight on each of the stocks. Which of the following are TRUE?

I. The expected return on Stock X is twice the expected return on Stock Y.

II. The beta of the portfolio is 1.2.

III. You can have a better risk-return profile when investing in the portfolio rather than holding an individual Stock X or Y.

(A) I

(B) I and II

(C) III

(D) None of the above

I. The correct statement should be that expected EXCESS return on Stock Y is twice the expected EXCESS return on Stock X.

E[Rx] =Rf + betax\*(E[Rm] – Rf) => E[Rx] - Rf减过之后的这个就是excess expected return = betax\*(E[Rm] – Rf)

E[Ry] =Rf + betay\*(E[Rm] – Rf) => E[Ry] - Rf = betay\*(E[Rm] – Rf)

令一些数字，把等式算出来就发现expected return不相等，是excess的相等

II. The correct statement should be that the beta of the portfolio is 0.6. Beta of a portfolio is a weighted average of the betas of different stocks in a portfolio. Since we are putting equal weights, beta of the portfolio = 0.5\*0.4 + 0.5\*0.8 = 0.6

III. You can form a higher Sharpe ratio for a portfolio if the correlation between two assets is smaller than 1. Correlation of 1 is a special case in which investors do not benefit from diversification. Hence, III is wrong.

11. You just performed a security characteristic line analysis on the Apple stock by regressing the excess Apple stock returns over the past 1 year at the daily frequency against the excess S&P 500 returns over the same period at daily frequency. Here is the result from the Excel regression.

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Coefficients* | *Standard Error* | *t Stat* |
| Intercept这个就是等式里的alpha | 0.04448 | 0.01592256 | 2.793520634 |
| X Variable 1这个是等式里的beta | 1.33142 | 0.349038593 | 3.814535199 |

如果t stat大于2或小于-2，代表I’m confident that there exists an alpha, so the capital asset pricing model is not true. 如果alpha不存在，这个model就true

Which of the following are true?

I. On average, when S&P 500’s excess return goes up by 1 percent, the Apple stock’s excess return will go up by more than 1%.

II. Whenever S&P 500’s excess return goes up by 1 percent, the Apple stock’s excess return will go up by more than 1%.

III. Capital Asset Pricing Model holds true in this case.

(A) I

(B) I and II

(C) I and III

(D) I, II, and III

Beta represents the average relationship between the excess return of the market portfolio and the excess return of the stock. In other words, when S&P 500’s excess return goes up by 1 percent, the Apple stock’s excess return will go up by 1.33142% ON AVERAGE. This statement is different from the statement that WHENVER S&P 500’s excess return goes up by 1 percent, the Apple stock’s excess return will go up by 1.33142%; sometimes, the excess stock return will be higher than the Beta percentage and sometimes lower than the Beta percentage if the market portfolio’s excess return goes up by 1% (Thus, stock return can be lower than 1% for some scenario.)

Capital Asset Pricing Model suggests that the excess return of a stock can only be explained by the excess return of the market portfolio. In other words, the alpha in Security Characteristic Line should be zero according to this theory. You identify whether the alpha is statistically significantly different from zero based on the t-stat of the intercept. If the t-stat is greater than 2, the alpha is different from zero, hence the model is not correct. On the other hand, if the t-stat is less than 2, alpha is not different from zero, and hence the model should be correct. In this case, the t-stat is 2.79, hence CAPM does not hold true.

The standard error talks about how precisely we estimated the alpha and beta. t-stat = coefficient/standard errors.

12. You have just bought a 5 year zero-coupon bond which has a YTM of 10% and a face value of $1000. 15 seconds after you purchased the bond, the YTM changes to 9%. What is the holding period return over this 15-second horizon?

(A) 0%

(B) 4.67%

(C) -4.46%

(D) 5.21%

Old price = 1000/1.1^5 = 620.92

New price = 1000/1.09^5 = 649.93

HPR = 649.93/620.92 – 1 = 0.0467

13. Which of the following is NOT true?

(A) If the Korean government is considered to have more default risk than the U.S. government, then investors will demand a higher expected return on Korean government bonds than they would demand on U.S. government bonds

(B) If the coupon rate on a bond is greater than the market interest rate, then the bond is being sold at **discount**

“If the coupon rate on a bond is greater than the market interest rate, then the bond is being sold at **premium**” is a correct statement

(C) When the market interest rate suddenly drops, the price of a bond tends to increase

(D) If you intend to sell the stocks you have been holding for one year but you find it difficult to find investors in the market who will buy your stocks, then your stocks involve illiquidity risk

14. The market’s nominal annual required rate of return (also called as market prevailing yield or nominal yield-to-maturity) for a bond is currently 8%. The maturity of the bond is 10 years, the coupon rate (paid semi-annually) is 4%, and the face value is $1000. What is the price of the bond?

(A) $516

(B) $728

(C) $1030

(D) $1118

Coupon: $20 every six month

Discount rate: 4% per six month

Number of periods: 20 of six months

Price = 20/0.04\*(1-1/1.04^20) + 1000/1.04^20 = 728

**Free Response**

1. You will make three monthly payments of $100 at the end of each month to purchase a phone. The annual percentage rate is 3%.

(A) What is the present value of the payments?

The effective interest rate is 0.03/12 per month i.e. 0.0025 per month

PV = 100/1.0025^1 + 100/1.0025^2 + 100/1.0025^3 = 298.51

(B) Compute the principal payment in the last month.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Monthly Payment | Interest Expense | Principal Payment | Ending Balance |
|  |  |  |  | 298.51 |
| Month 1 | 100 | 0.75 | 99.25 | 199.25 |
| Month 2 | 100 | 0.50 | 99.50 | 99.75 |
| Month 3 | 100 | 0.25 | 99.75 | 0.00 |

Hence, the principal payment in the last month is 99.75.

2. On March 8, 2022, Company XYZ issued 1 million of bonds whose face value is $1000, has a maturity of 11 years, and pays coupons annually at the coupon rate of 10%. At the time of issuance, the yield-to-maturity (YTM) was 10%. Today, Company XYZ just paid coupons, and YTM on March 8, 2023 is 9%.

(A) On March 8, 2022, you bought one of the bonds that were issued by Company XYZ. How much did you pay for the bond?

This is a par bond. $1000

(B) What is the price of the bond on March 8, 2023?

The bond’s original maturity was 11 years, but on March 8, 2023, it became a 10-year maturity bond.

1 2 3 4 5 6 7 8 9 10

100 100 100 100 100 100 100 100 100 1100

PV@9% 91.74 84.17 77.22 70.84 64.99 59.63 54.70 50.19 46.04 464.65

Sum 1064.18

On the Exam, I would use the following:

100/0.09\*(1-1/1.09^10) + 1000/1.09^10 = 1064.18

$1064.18

(C) What is the holding period return over the one year horizon (from March 8, 2022 to March 8, 2023)?

(100 + 1064.18 – 1000)/1000 = 0.1642

3. The expected returns and standard deviation of returns for two securities are as follows:

Security Z Security Y

Expected Return 15% 35%

Standard Deviation 20% 40%

The correlation between the returns is + .1

(A) Calculate the expected return and standard deviation for the following portfolios:

i. all in Z

ii. .75 in Z and .25 in Y

iii. .5 in Z and .5 in Y

iv. .25 in Z and .75 in Y

v. all in Y

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | Weight on Z | Weight on Y | | Expected Return | Standard Deviation | | portfolio i | 1 | 0 | 0.15 | | 0.2 | | portfolio ii | 0.75 | 0.25 | 0.2 | | 0.188 | | portfolio iii | 0.5 | 0.5 | 0.25 | | 0.232 | | portfolio iv | 0.25 | 0.75 | 0.3 | | 0.309 | | portfolio v | 0 | 1 | 0.35 | | 0.4 | |  |  |  |  |

Expected Return =

Standard Deviation =

(B) Draw the graph of the investment opportunity set, where Y-axis is the expected return of the portfolios and X-axis is the standard deviation of the portfolios from Part (A).

4. Company ABC’s stock has a beta of 2 and a standard deviation of 40%. The market portfolio has an expected return of 1.5% and standard deviation of 10%. The risk-free rate is 1%. Company ABC has just made a dividend payment of $1/share. The dividend will go up by 10% every year over the next two years, and then it will go up by 1% per year thereafter.

(A) Find the correlation between the stock return and the market portfolio return

beta = cov(RABC,Rm)/var(Rm)

2 = correlation\*std(RABC)\*std(Rm) / std(Rm)2 = correlation \*0.4\*0.1/0.1/0.1

Correlation = 0.5

(B) Find the expected return on this stock

Expected return = Rf + beta(E[Rm]-Rf) = 0.01 + 2\*(0.015-0.01) = 0.02

(C) Find the Sharpe ratio of a portfolio that puts 100% weight on this stock and 0% weight on the risk-free asset

Basically, you want to compute the Sharpe ratio of the stock, i.e. you already know the expected return and standard deviation of the stock

Sharpe ratio = (E[RABC]-Rf)/ std(RABC) = (0.02-0.01)/0.4 = 0.025

(D) What should be the price of the stock?

|  |  |  |  |
| --- | --- | --- | --- |
| Year | 1 | 2 | 3 |
| Dividend | 1.1 | 1.21 | 1.2221 |
| CF |  | 122.21 |  |
| PV @ r = 0.02 | 1.08 | 118.63 |  |
| Sum of PV | 119.71 |  |  |

D1 = 1\*1.1 = 1.1

D2 = 1\*1.1^1 = 1.21

D3 = 1\*1.1^2 \* 1.01 = 1.2221

Using constant growth model, P2 = D3/(r-g) = (1.2221)/(0.02-0.01) = 122.21

Price = PV(D1) + PV(D2) + PV(P2) = 1.1/1.02 + 1.21/1.02^2 + 122.21/1.02^2 = 119.71

5. Fill in the following blanks, given the following information:

Total asset turnover ratio is 3.6  
Gross profit margin is 10%.  
Average collection period is 36 days  
Inventory turnover ratio is 32.4  
Acid-test ratio is 2.3

Assume that there are 360 days in a year and all sales were made on credit.

|  |  |  |  |
| --- | --- | --- | --- |
| Cash | 10 | Accounts Payables | 20 |
| Accounts Receivables | 36 | Long-term Debt | 20 |
| Inventory | 10 | Common Stock | 20 |
| Plant and Equipment | 44 | Retained Earnings | 40 |
| Total Assets | 100 | Total Debt and Shareholders' Equity | 100 |

Assets = Debt + Equity. Total Debt and Shareholders' Equity = 100. Hence, Common Stock is 20.

Asset turnover = Sales/Assets = 3.6. Hence, sales = 360.

Gross profit margin = (Sales – COGS)/Sales = 0.1. Hence, COGS = 324.

Average collection period = 360/(Sales/ Accounts Receivables) = 36. Hence, Accounts Receivables is 36.

Inventory turnover = COGS/Inventory = 32.4. Hence, Inventory is 10.

Acid-test ratio = (Cash + Accounts Receivables)/Accounts Payables = (Cash + 36)/20 = 2.3. Hence, Cash = 10.

Plant and Equipment is the remaining component in Total Assets. It is 44.