## Multiple Choice – 2 points each

1. Which of the following are empirical asset pricing models?
   A. The Fama-French 3-Factor Model
   B. The Capital Asset Pricing Model
   C. Both of the above are empirical asset pricing models
   D. Neither of the above are empirical asset pricing models

2. According to your readings, which of the following is true?
   A. The Fama-French 3-Factor Model has more predictive power than the CAPM
   B. Fama and French believe the CAPM doesn't work as well as their model because the market is not as efficient as it used to be
   C. While both the CAPM and the 3-Factor Model explain some of a stock's returns, they typically explain less than 50%.
   D. None of the above are true

3. Maverick primarily invests in
   A. Stocks
   B. Bonds
   C. Real Estate
   D. A variety of illiquid assets

4. According to your readings, which input into the CAPM is the most difficult to come up with and has the most variability among those using the CAPM?
   A. The risk-free rate
   B. Beta
   C. The market risk premium 2 - 12%
   D. The proxy for the market

5. Which of the following can always be redeemed at its NAV?
   A. Shares of an ETF
   B. Shares of a Hedge Fund
   C. Shares of a Mutual Fund
   D. All the above

10

6. Which of the following is true about a 130/30 fund?
   A. It has a weight of 130 percent on the stocks it takes a long position in
   B. It has a weight of -30 percent on the stocks it takes a short position in
   C. Both A and B are true
   D. Neither A nor B are true

7. Which of the following statements are true about a very large portfolio?
   A. The variance of the portfolio will be the average covariance between the assets
   B. If the average correlation between the assets is zero, it will be a risk-free portfolio
   C. Both A and B are true
   D. Neither A nor B are true

8. If a risky asset has an expected return of 12% and a standard deviation of 20%, you can lend risk-free at 7%, and you can borrow risk-free at 9%, what is the standard deviation of a portfolio (comprised of these assets) with an expected return of 18%?
   A. 40%
   B. 60%
   C. 80%
   D. You can't get an expected return of 18% in this situation

9. Which of the following are theoretical asset pricing models?
   A. The Capital Asset Pricing Model
   B. The Fama-French 3-Factor Model
   C. Both of the above are theoretical asset pricing models
   D. Neither of the above are theoretical asset pricing models

10. The Sharpe Ratio
   A. Can be found for any risky asset if we know where it lies in mean/variance space and we know the risk-free rate
   B. Is the expected return for a risky asset minus the risk-free rate, with that quantity divided by the risky asset's standard deviation
   C. Is the slope of the capital allocation line that runs through a risky asset
   D. All the above are correct

10

11. If you ask solver to find the lowest standard deviation for a portfolio of stocks with an expected return of 10%, and then ask it to find the lowest standard deviation for the same portfolio of stocks with the same expected return, but with a "no short-selling" constraint, which of the two portfolios will have a lower standard deviation (if solver doesn't come up with the same standard deviation both times)?
    A. The first portfolio will have a lower standard deviation
    B. The second portfolio will have a lower standard deviation
    C. Depending on the data, either answers A or B could be correct
    D. Both portfolios will always have the same standard deviation

12. Look at Problem 2 – Investor Preferences on this test. Which asset has the highest certainty equivalent?
    A. Asset A
    B. Asset B
    C. The Risk-free asset
    D. There is not enough information to know

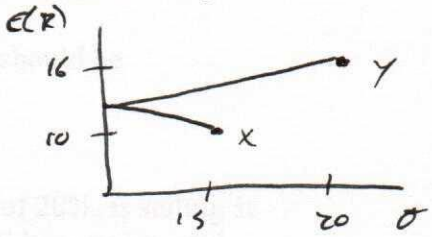
13. Asset A has an expected return of 12% and a standard deviation of 20%. Asset B has an expected return of 14% and a standard deviation of 18%. Their correlation is 0.4. The risk-free rate is 3%. If an investor can combine either asset A or asset B with the risk-free asset (but cannot combine A and B with each other), will the investor choose to be on the Capital Asset Line for A or the Capital Asset Line for B?
    A. A
    B. B
    C. It depends on the investor's coefficient of risk aversion
    D. It depends on whether the investor will borrow or lend at the risk-free rate

14. If most stocks go down in value when GDP (gross domestic product) goes down, you would expect the risk premium for GDP to be _____ in a multifactor model.
    A. Positive
    B. Negative
    C. Equal to zero
    D. There is not enough information in the question to know for sure

15. Which of the following will generate a margin call – and for how much?
    A. If you fall below the initial margin, you must bring yourself back to the initial margin
    B. If you fall below the initial margin, you must bring yourself back to the maintenance margin
    C. If you fall below the maintenance margin, you must bring yourself back to the initial margin
    D. If you fall below the maintenance margin, you must bring yourself back to the maintenance margin

10

16. Stock X has an expected return of 10% and a standard deviation of 15%. Stock Y has an expected return of 16% and a standard deviation of 20%. The correlation between these two stocks is -1.0. These two stocks are the only available investments. What percentage of your money must be invested in Stock X if you want to create a risk-free portfolio?




A. 57.14%
B. 58.82%
C. 61.76%
D. None of the above will give you a risk-free portfolio

17. Which of the following statements about ETFs is false?
A. They allow you to short an entire industry
B. The fund manager stands ready to sell more shares at the NAV
C. Every time you buy or sell them, there is a commission charge
D. Their expense ratios are generally less than the expense ratios for actively managed mutual funds

18. Which of the following is **not** an example of momentum in stock prices?
A. Stock prices tend to continue to move in the same direction for several months after a price change
B. Stock prices tend to continue to move up for several months after a surprisingly positive earnings announcement
C. Stock prices tend to continue to move down for several months after a surprisingly negative earnings announcement
D. Stock prices tend to continue to move up for several months after a merger announcement

19. The Dow Jones Industrial Average is a _____ weighted index. The S&P 500 is a _____ weighted index.
A. Market-value; Market-value
B. Price; Price
C. Market-value: Price
D. Price; Market-value

20. Which of the following is an index that is commonly used to measure the performance of small-cap stocks?
A. Russell 1000
B. Russell 2000
C. Russell 3000
D. Wilshire 5000

come back

10

21. Which of the following is **not** an assumption of the CAPM?
    A. Investors are only concerned with the expected return and standard deviation of their portfolios
    B. All investors will reach the same conclusion about what the correct correlation between two stocks is
    C. All investors agree on what the market risk premium should be
    D. There are no taxes on any investment earnings

22. Stock X has an expected return of 10%, a standard deviation of 20%, is selling at $40 per share and has one million shares outstanding. Stock Y has an expected return of 20%, a standard deviation of 30%, is selling at $30 per share and has two million shares outstanding. The correlation between these two stocks is 0.4. What is the standard deviation of a market value weighted portfolio of these two stocks?
    A. 21.68%
    B. 22.43%
    C. 26.00%
    D. None of the above are correct

23. The Federal Reserve Bank of New York's review of equity risk premium models says that
    A. There are many models of the equity risk premium
    B. It is difficult to find precise estimates of the equity risk premium
    C. The equity risk premium was higher than usual in 2012 and 2013
    D. All of the above are true

24. How many factors are there in the latest Fama/French multifactor model?
    A. Three
    B. Four
    C. Five
    D. Six

25. Which of the following statements is false?
    A. Martingale feels that going forward, investors are better off to invest in the MVP than the MVE
    B. Fama and French believe that it is ok to teach the CAPM as an introduction to basic concepts if it is built on by more complex models
    C. Research has shown that over the past 90 years, stocks with a low book-to-market ratio have tended to outperform stocks with a high book-to-market ratio
    D. If the risk-free rate has been the same every month for the past five years, a regression over that time period using absolute returns for the market and the stock will give you the exact same estimate of beta that a regression using excess returns will give you

10

**Annualized Standard Deviations** (percentage)

AMZN 26.66%
JPM 18.84%
DIS 17.44%

**Betas** (decimal)

AMZN 1.5101
JPM 1.1619
DIS 1.2543

**Expected Returns** (percentage)

AMZN 11.61%
JPM 9.62%
DIS 10.15%

**Correlation Matrix** (decimal)

| | AMZN | JPM | DIS |
|---|---|---|---|
| **AMZN** | 1 | xxxx | xxxx |
| **JPM** | 0.2145 | 1 | xxxx |
| **DIS** | 0.3606 | 0.4923 | 1 |

**Annualized Variance/Covariance Matrix** (decimal)

| | AMZN | JPM | DIS |
|---|---|---|---|
| **AMZN** | 0.0710 | xxxx | xxxx |
| **JPM** | 0.0107 | 0.0354 | xxxx |
| **DIS** | 0.0167 | 0.0162 | 0.0304 |

**Standard Deviations and Weights on the Efficient Frontier** (percentage for standard deviation and decimal for weights). In the first row, show the expected return, standard deviation and weights for an equally-weighted portfolio.

| E(R) | σ | AMZN | JPM | DIS |
|---|---|---|---|---|
| **Equally Weighted** 10.46% | 15.79% | .3̄ | .3̄ | .3̄ |
| **9%** | 22.87% | -0.4522 | 0.9308 | 0.5214 |
| **10%** | 15.31% | 0.0656 | 0.4660 | 0.4684 |
| **11%** | 19.39% | 0.5835 | 0.0012 | 0.4153 |

14

## Problem 2 – Investor Preferences – 8 points

An investor has a quadratic utility function of the form we looked at in class, where $U = E(R) - \frac{1}{2} A \sigma^2$. This investor has a coefficient of risk aversion of 3.50.

There are two risky assets and a risk-free asset available to this investor. Asset A has an expected return of 8% and a standard deviation of 18%. Asset B has an expected return of 14% and a standard deviation of 22%. Assets A and B have a correlation of 0.3. $R_f$ is a risk-free investment with a return of 3%. Please answer the following questions:

1. Would our investor prefer to invest all her money into asset A, asset B, or the risk-free asset (She cannot combine assets for this particular question)? Circle the correct answer (you don't need to show your work).

   A (B) Rf

2. Find the Mean/Variance Efficient Portfolio (MVE) by combining assets A and B.

   Proportion of A 0.2726

   Proportion of B 0.7274

   Expected Return of MVE 12.36%

   Standard Deviation of MVE 18.09%

   Slope of the CAL that passes through the MVE 0.5176

3. Our investor has $1,000 to invest with us. Our job is to allocate her money among Assets A, B, and $R_f$ so that it maximizes her utility. Short selling and borrowing at $R_f$ are allowed. How much money will be invested in each asset and what level of utility will this give our investor? (Be sure to answer the first three parts in dollars and cents)

   Money in A $222.88 Money in B $594.64

   Money in Rf $182.48 Utility 0.0683

4. Find the Minimum Variance Portfolio (MVP) by combining assets A and B.

   Expected Return of MVP 10.16%

   Standard Deviation of MVP 15.82%

## Problem 3 – Estimating Beta – 8 points

Use the monthly returns that you calculated in the first problem for Amazon and the S&P 500 to answer the questions for this problem. Do not recalculate Amazon's monthly returns.

Additionally, you will need to go to the following website to download the monthly risk-free rates that you will need for this problem https://breesefine7110.tulane.edu/midterm/ Note that the spreadsheet with the risk free rates has additional information on it that you will need for problem 4. For this problem, the only data that you will need from the website are the risk-free rates.

Use linear regression in Excel to estimate the beta for Amazon (AMZN) using excess returns. Use the results from your regression to answer the following questions. Please show the results of your regression in the Excel file you turn in. Please carry out your answers to the following questions to **four decimal places**. Amazon is a tech stock. The average beta for tech stocks is 1.10.

What is your estimate of Amazon's beta? 1.5055

What is the standard error of your estimate of Amazon's beta? 0.3103

What is the t-statistic for a test of whether Amazon's beta is different from the industry average for tech stocks? **(Show your work here on this hard copy)**

t-test = $\frac{1.5055 - 1.1}{0.3103} = 1.3067$

Based on your point estimate of Amazon's beta, if you added some shares of Amazon to the market portfolio (so that the weighting on Amazon is about 1%), what would happen to the standard deviation of the market portfolio? You do not need to show any work. Just circle the correct answer.

(A) It would go up
B. It would go down
C. It would not change
D. There is not enough information here to know

In one sentence, explain why your estimate of Amazon's beta in this problem is different from the beta you found for it in problem 1.

the beta I found in problem 1 is based on the absolute return of AMZN and market while the beta I found in problem 4 is based on the excess return of AMZN and market.

Which estimate of Amazon's beta do you consider to be more accurate if you want to use it in the CAPM?

(A) Beta estimate in this problem
B. Beta estimate in problem 1

8

## Problem 4 – Three Factor Model – 12 points

For this problem, use the returns that you calculated for Disney (DIS) in problem 1 (do **not** use the S&P 500 returns). Additionally, you will need to go to https://breesefine7110.tulane.edu/midterm/ to find the Fama-French data you will need for this problem. These are all monthly returns.

For this problem, the current risk-free rate is 3.0%, the expected market risk premium is 5.7%, the expected SMB risk premium is 2.5%, and the expected HML risk premium is 3.5% (all these figures are annualized). You **do not** need to average past returns to find expected future returns or risk premiums.

Calculate estimates of the three Fama-French betas for Disney (four decimal places for each please).

$\beta_1$ 1.2628

$\beta_2$ −0.1590

$\beta_3$ 0.0910

Calculate the annualized expected return for Disney using the above information (four decimal places please). **(Show your work here on this hard copy)**

H-value

$E(R) = R_f + \beta_1 (R_m - R_f) + \beta_2 \times SMB_{RP} + \beta_3 HML_{RP}$

$= 3.0 + 1.2628 \times 5.7 + (-0.1590) \times 2.5 + 0.0910 \times 3.5$

$= 10.1190\%$

Based on your beta estimates (assume for this question that your estimates are the true betas), what can you say about Disney's sensitivity to the three factors? Circle as many letters as apply.

A. Disney acts like a small-cap stock
B. Disney acts like a large-cap stock
C. Disney acts like a value stock
D. Disney acts like a growth stock
E. Disney tends to do better when stocks with a higher market cap outperform stocks with a lower market cap
F. Disney tends to do better when value stocks outperform growth stocks
G. Disney tends to do better when growth stocks outperform value stocks
H. Disney tends to do better when the market outperforms the risk-free rate
I. Disney tends to do better when the market underperforms the risk-free rate
J. Disney tends to do better when stocks with a lower market cap outperform stocks with a higher market cap

12

## Problem 5 – Stock Market Indexes – 8 points

There are five stocks in the brand new, New Orleans Stock Market. You have been hired by CNBC to come up with an index for the N.O. market. You decide to present three indexes for their consideration: a price-weighted index, a market value-weighted index, and an equally-weighted index using an arithmetic mean. Here is the data for these five stocks on the first two days the market is open. Show how you calculate index values for each day under each of the three weighting systems either on this hard copy or in Excel. Where necessary, use a base value of 100. Note: there are no units for index values, they are just numbers.

| | Day One Price | Day Two Price | Shares Outstanding |
|---|---|---|---|
| **Stock 1** | \$90 | \$84 | 40 million |
| **Stock 2** | \$35 | \$37 | 50 million |
| **Stock 3** | \$120 | ~~\$124~~ 62 | ~~9~~ million 18 million |
| **Stock 4** | \$45 | \$48 | 110 million |
| **Stock 5** | \$280 | \$275 | 35 million |

**Your Solution Index Values – Please carry out to four decimal places**

| | Day 1 | Day 2 |
|---|---|---|
| **Price-weighted Index** | 114 | 113.6 |
| **Value-weighted Index** | 100 | 100.2408 |
| **Equally-weighted Index** | 100 | 101.4524 |

Suppose that Stock 3 has a two-for-one stock split at the same time it closes at \$124 at the end of day two, so that its reported closing price is \$62 and it now has 18 million shares outstanding. One of the indexes will need to change its divisor. Which index needs to make the change and what will its new divisor be (please carry out your answer on the new divisor **four decimal places**)?

Index Price-weighted Index

New Divisor 4.4542

before split, index = 113.6
after split, sum of the prices at day 2 will be 506
506 / 113.6 = 4.4542

8