

First Midterm Exam

Fall 2020

Econ 180-367

Time Allowed: 1 Hour

Part A Multiple choice questions. Only one option is correct. 3 points per question.

1. Which of the following is the standard deviation of annual returns on the S&P500 index?
 - A. 2 percent.
 - B. 4 percent.
 - C. 8 percent.
 - D. 10 percent.
 - E. 17 percent.

2. Suppose that the risk-free rate is 2 percent and the expected market return is 10 percent. Suppose that IBM has a beta of 1.5. According to the CAPM, what should the expected return on IBM stock be?
 - A. 3 percent.
 - B. 10 percent
 - C. 14 percent.
 - D. 15 percent.
 - E. 17 percent.

3. Suppose that the annual percentage rate on an investment is 4 percent with quarterly compounding. What is the effective annual rate?
 - A. 1 percent.
 - B. 4 percent.
 - C. 4.06 percent.
 - D. 4.18 percent.
 - E. 16 percent.

4. The correlation between the returns on Pfizer and Johnson and Johnson is 0.3. The standard deviation of returns on Pfizer is 0.25. The standard deviation of returns in Johnson and Johnson is 0.16. What is the covariance between the returns on Pfizer and Johnson and Johnson?
 - A. 0.0135
 - B. 0.012
 - C. 0.048
 - D. 0.06
 - E. 0.075

5. A firm has an asset (unlevered) beta of 2. It's assets are \$50 million and it's equity is \$25 million. What is it's equity (levered) beta?
 - A. 0.5
 - B. $\frac{2}{3}$
 - C. 1
 - D. 4
 - E. 6

6. Suppose that Hopkins Hedge fund has an average annual return of 0.1 (10 percent), the risk-free rate is 0.02 and the variance of returns is 0.25. What is the Sharpe ratio of the Hopkins hedge fund?
 - A. 0.16
 - B. 0.24

- C. 0.32
- D. 0.4
- E. 0.48

7. You pay \$9,900 for a 180 day T-Bill. What is the quoted yield (on a discount basis)?

- A. 1 percent
- B. 1.01 percent.
- C. 2 percent
- D. 2.02 percent.
- E. 2.21 percent.

8. Suppose that an investor is offered a project which will be worth \$100 with probability 50 percent and worthless with probability 50 percent. The certainty equivalent of this project is \$40. This investor must be:

- A. Risk neutral
- B. Risk averse
- C. Risk seeking
- D. An investor with increasing marginal utility of wealth.
- E. None of the above.

9. Joe and Susan are both selecting a portfolio involving debt, equity and a riskfree asset using the Markowitz portfolio selection model. Joe allocates 40 percent of his portfolio to the riskfree asset, 40 percent to debt and 20 percent to equity. Susan allocates 10 percent to equity. How much does Susan allocate to debt?

- A. 10 percent.
- B. 20 percent
- C. 40 percent.
- D. 80 percent.
- E. It cannot be determined from the information given.

10. Suppose that you form an equal weighted portfolio of 100 stocks that each has a standard deviation of 0.2 and are all mutually uncorrelated. What is the standard deviation of the portfolio?

- A. 0.002
- B. 0.01
- C. 0.02
- D. 0.2
- E. 2.2

11. Which of the following best describes the income tax treatment of interest on Treasuries and municipal securities?

- A. Treasury interest is subject to state and local tax and municipal interest is subject to federal tax.
- B. Treasury interest is not subject to state and local tax, but municipal interest is subject to federal tax.
- C. Treasury interest is subject to state and local tax, but municipal interest is not subject to federal tax.
- D. Treasury interest is not subject to state and local tax and municipal interest is not subject to federal tax.
- E. Treasury interest is not subject to state and local or federal income tax.

12. Which of the following best describes average returns on portfolios of stocks

- A. Stocks with large market cap have **higher** average returns than stocks with low market cap, and stocks with high book-to-market ratios have **higher** average returns than stocks with low book-to-market ratios.
- B. Stocks with large market cap have **higher** average returns than stocks with low market cap, and stocks with high book-to-market ratios have **lower** average returns than stocks with low book-to-market ratios.

- C. Stocks with large market cap have **lower** average returns than stocks with low market cap, and stocks with high book-to-market ratios have **higher** average returns than stocks with low book-to-market ratios.
- D. Stocks with large market cap have **lower** average returns than stocks with low market cap, and stocks with high book-to-market ratios have **lower** average returns than stocks with low book-to-market ratios.
- E. Market cap and book-to-market ratios are irrelevant for the average return on stocks.

13. Which of the following best describes federal funds.

- A. Loans made by banks to each other.
- B. Loans made by banks to the Federal Reserve System.
- C. Loans made by the Federal Reserve System to banks
- D. Funds raised by the federal government in the bond market.
- E. Loans made by the Federal Reserve System to the US Treasury.

14. What is the current level of one month Treasury bill yields?

- A. 10 basis points.
- B. 50 basis points
- C. 1 percent.
- D. 10 percent.
- E. 12 percent.

15. You enter a repurchase agreement where you buy a Treasury security today for \$1,000 and agree to sell it back in 360 days for \$1,010. What is the quoted repo interest rate?

- A. 99 basis points.
- B. 1 percent.
- C. 2 percent.
- D. 9.9 percent.
- E. 10 percent.

Part B: Short Answers.

16 (5 points). Suppose that interest rates are 5 percent per annum forever. What is the present value of a bond that pays \$50 in one year and \$100 in two years?

17 (5 points). Consider an investor with a utility function $u(W) = -\exp(-W)$ where W is her wealth. What is this investor's coefficient of absolute risk aversion?

18 (5 points). There are two possible outcomes for stocks A and B; each will either earn a return of +10% or -5%. Here are the probabilities of the four possible joint outcomes:

	B return is -5%	B return is +10%
A return is -5%	50%	10%
A return is +10%	10%	30%

Find the expected return of stocks A and B.

19 (5 points). Consider the same scenario as in question 18. Find the variance of the percentage returns of stocks A and B.

20 (5 points). Consider the same scenario as in question 18. Find the standard deviation of the percentage returns of stocks A and B.

21 (5 points). Consider the same scenario as in question 18. Find the covariance between the percentage returns of stocks A and B.

22 (5 points). Consider the same scenario as in question 18. Find the correlation between the percentage returns of stocks A and B.

23 (10 points). Suppose that there are two stocks, X and Y. X has returns with mean 10 percent and standard deviation 15 percent. Y has returns with mean 12 percent and standard deviation 15 percent. Let their correlation be -0.6. Let the riskfree rate be 5 percent. If an investor is forming a portfolio of X and Y alone to have the minimum variance, what weight will be put on stock X?

24 (10 points). Consider the scenario in question 23. If an investor is forming a portfolio of X and Y alone to have the maximum Sharpe ratio, what weight will be put on stock X?

Solutions.

1. E
2. C
3. C
4. B
5. D
6. A
7. C
8. B
9. B
10. C
11. D
12. C
13. A
14. A
15. A

16. It is $\frac{50}{1.05} + \frac{100}{1.05^2} = \138.32 .

17. It is $-\frac{u''(w)}{u'(w)} = -\frac{-\exp(-W)}{\exp(-W)} = 1$.

18. For either stock, the probability of -5% is 60% and the probability of +10% is 40%. So either expected return is $(-0.6*5)+(0.4*10)=1\%$.

19. The variance is $0.6 * (-0.05 - 0.01)^2 + 0.4 * (0.1 - 0.01)^2 = 0.0054$.

20. It is the square root of the answer in 19: 0.073485.

21. It is

$$0.5 * (-0.05 - 0.01)^2 + 0.1 * (-0.05 - 0.01) * (0.1 - 0.01) + 0.1 * (0.1 - 0.01) * (-0.05 - 0.01) + 0.3 * (0.1 - 0.01)^2 = 0.00315$$

22. It is $0.00315/0.0054=0.583$.

23. The covariance is $-0.6 * 0.15 * 0.15 = -0.0135$. So the minimum variance weight on X is:

$$\frac{0.15^2 + 0.0135}{0.15^2 + 0.15^2 + 0.0270} = 0.5$$

24. The weight on X is:

$$\frac{0.05 * 0.15^2 + 0.07 * 0.0135}{0.05 * 0.15^2 + 0.07 * 0.15^2 + [0.05 + 0.07] * 0.0135} = 0.479$$