Problems 1 through 8: You should use the Portfolio Frontier Spreadsheet posted on the website to solve these problems. For each problem, set the initial parameters in the relevant spreadsheet according to the table below. You should try to answer a few of the questions by hand (using the appropriate formulae) and check your solutions using the spreadsheet. So, try calculating the weights, expected return, and standard deviation for the MVP in problems 1 through 4 and for the optimal portfolio of risky assets in problems 5 and 6. The object of this exercise is for you to try to understand the intuition of how the changes in expected returns, standard deviations, and correlations change the shape of the portfolio possibilities set (the portfolio frontier) and the weights, expected return, and standard deviation for the minimum variance portfolio (MVP) or the optimal portfolio of risky assets. Problems 7 and 8 are practice for solving for complete portfolio weights and dollar values. You can still use the spreadsheet to help you find the optimal portfolio weights, expected return, and standard deviation.

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<th>Asset</th>
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1. Use the “MVP 4” spreadsheet with the initial parameters given in the table. Answer the following questions, being careful to reset the parameters to their initial values after each question. What happens to the weights of the MVP and the expected return and standard deviation of the MVP when you...
   a) increase and decrease the expected return for asset A?
   b) increase and decrease the standard deviation for asset A?
   c) increase and decrease the expected return for asset B?
   d) increase and decrease the standard deviation for asset B?
   e) increase the correlation coefficient toward +1 and decrease the correlation coefficient to -1?
   f) change the correlation coefficient to +1 or -1?

2. Use the “MVP 4” spreadsheet with the initial parameters given in the table and repeat problem 1.

3. Use the “MVP 4” spreadsheet with the initial parameters given in the table and repeat problem 1.

4. Use the “MVP 4” spreadsheet with the initial parameters given in the table and repeat problem 1.
5. Use the “Optimal” spreadsheet with the initial parameters given in the table. Answer the following questions, being careful to reset the parameters to their initial values after each question. What happens to the weights of the optimal portfolio and the expected return and standard deviation of the optimal portfolio when you...
   a) increase and decrease the expected return for asset A?
   b) increase and decrease the standard deviation for asset A?
   c) increase and decrease the expected return for asset B?
   d) increase and decrease the standard deviation for asset B?
   e) increase the correlation coefficient toward +1 and decrease the correlation coefficient toward -1?
   f) change the correlation coefficient to +1 or -1? Use the “Optimal” spreadsheet with the initial parameters given in the table and repeat of problem 1.

6. Use the “Optimal” spreadsheet with the initial parameters given in the table and repeat of problem 5.

7. Assume the correlation between assets A and B is 0.25. Suppose that you have a total of $400,000 to invest in a complete portfolio.
   a) What are the weights in assets A and B that make up the optimal portfolio of risky assets? What is the expected return and standard deviation of the optimal portfolio?
   b) How much money should you invest in each asset if you want a standard deviation of returns for your complete portfolio of no more than 12%? What is your expected return from this portfolio?
   c) How much money should you invest in each asset if you want a standard deviation of returns for your complete portfolio of no more than 5%? What is your expected return from this portfolio?
   d) How much money should you invest in each asset if you want an expected return for your complete portfolio of 10%? What is the standard deviation of this portfolio?
   e) How much money should you invest in each asset if you want an expected return for your complete portfolio of 20%? What is the standard deviation of this portfolio?

8. Assume the correlation between assets A and B is 0.20. Suppose that you have a total of $500,000 to invest in a complete portfolio.
   a) What are the weights in assets A and B that make up the optimal portfolio of risky assets? What is the expected return and standard deviation of the optimal portfolio?
   b) How much money should you invest in each asset if you want a standard deviation of returns for your complete portfolio of no more than 20%? What is your expected return from this portfolio?
   c) How much money should you invest in each asset if you want a standard deviation of returns for your complete portfolio of no more than 8%? What is your expected return from this portfolio?
   d) How much money should you invest in each asset if you want an expected return for your complete portfolio of 10%? What is the standard deviation of this portfolio?
   e) How much money should you invest in each asset if you want an expected return for your complete portfolio of 15%? What is the standard deviation of this portfolio?

9. Obtain the monthly returns for IBM (symbol: IBM) and Ford Motor Company (symbol: F) from June 1977 through June 1999. Put these into a spreadsheet. You can easily obtain monthly prices (split- and dividend-adjusted) from http://quote.yahoo.com by choosing to view a table of monthly returns from June 1, 1977 through June 30, 1999. Then choose to 'Download Spreadsheet Format'. Convert he prices to returns, then use a spreadsheet to answer the following questions.
   a) Determine the average monthly return and the standard deviation of monthly returns for both companies. Also, determine the correlation coefficient between the two companies’ returns.
   b) What weights would result in the minimum variance portfolio? What would its expected (average) return and standard deviation be?
   c) Verify your answer to the previous question by creating three portfolios based on the last 21 years' monthly returns. Portfolio A should have the weights you found for the minimum variance portfolio. Portfolio B portfolio should have a weight that is 10% higher for IBM (hence, 10% lower for Ford) than the MVP. Portfolio C should have a weight that is 10% lower for IBM (hence, 10% higher for Ford) than the MVP. Verify that the standard deviation for portfolio A is lower than the standard deviations for portfolios B and C. Also, verify that the Portfolio A’s average return and standard deviation are close to what the formula's suggest that they should be.
10. Re-do the last question with annual returns (rather than monthly returns). Simply use the data for the month of June for each year in order to calculate annual returns. Compare your answers (notably, the weights for the MVP) that you get from using monthly returns. Are the weights the same?

11. Assume that the market risk premium is 15.4% and the riskfree rate is 4.9%. What is the fair price of a stock with a beta of 0.79 that pays a dividend of $1.25 per year, forever?

12. The market risk premium is 16.5%, the riskfree rate is 4.6%, and the stock's beta is 1.30. The standard deviation of the stock's return over the past 3 years is 25.7%. Analysts agree that the firm will begin paying a dividend in 5 years. The first dividend is expected to be $4 per share. After the first dividend, analysts predict that dividends will grow at 6% per year. What should investors be willing to pay for this stock?

13. Assume that the market risk premium is 16% and the riskfree rate is 5%. Dual-Voice Dynamics (DVD) stock just paid a dividend of $2 per share (yesterday). Dividends are expected to grow forever at a rate of 8% per year. DVD's beta is 1.20.
   a) What is the current fair price for DVD?
   b) Suppose the technology involved in DVD's product line changed, which resulted in a new beta of 1.30 for the stock. By what percentage should DVD's price change (from part i.) to reflect this new information?
   c) Returning to the original values for all variables, suppose that the Fed lowers interest rates, causing a decline in the riskfree rate to 4.75%. By what percentage should DVD's stock change (from part i.) to reflect this new information (assume that the market risk premium remains unchanged)?
   d) Returning to the original values for all variables, suppose that analysts cut their estimate of DVD's growth to 7% (from 8%) per year. By what percentage should DVD's stock change (from part i.)?

14. As the investing population ages (the average age of investors increases) and investors overall become less risk tolerant, what should happen to the price of all stocks? Why? (Hold everything else constant: riskfree rates, betas, growth rates).

15. Suppose that the market is semi-strong form efficient, but not strong form efficient. Describe a trading strategy that would result in abnormally high expected returns.

16. Suppose that the market is weak form efficient, but not semi-strong form efficient. Describe a trading strategy that would result in abnormally high expected returns.

17. Suppose that the market is not weak form efficient. Describe a trading strategy that would result in abnormally high expected returns.

18. Reconcile the following two statements. "The market is semi-strong form efficient." "My co-worker claims to have no access to inside information, but consistently (over a very long time) earns a return higher than fair for the risks in her portfolio."

19. Discuss the following. "There are people who make a lot of money in the stock market, so it must not be efficient."

20. Discuss the following statements. "Several people in my Fi8000 class invested $500,000 and ended up with over $800,000 in 10 weeks. This evidence contradicts the efficient markets hypothesis."

21. Discuss the following statement. "Academic researchers have tested every published trading strategy and found that none generates abnormal returns. Therefore, the market is at least semi-strong form efficient."

22. Discuss the following statement. "I talked to my cousin Joe at Thanksgiving. He said that his investment strategy is to hold a well-diversified portfolio, such as an S&P 500 index mutual fund. He must not know much about finance. Otherwise, he would pick the best stocks to invest in."

23. Discuss the following situation. "A colleague approaches you with the 'perfect' investment strategy that he claims will earn an average of 30% per year with much less risk than even a very well diversified portfolio of well-known stocks. He claims that, in the past 30 years, the strategy has never had a negative return, and it has had a return of up to 50% in a couple of years."