Final Exam (150 minutes)

You don't need to do tedious calculations; if calculations are needed, you must write the explicit equation(s), identifying the variables. Do not write "Y = aX; solve for X." You can write "100 = 10X; solve for X." If you want extra time, you can buy time at a price of 1 point a minute; for example, if your test is handed in 10 minutes after the scheduled finish time, 10 points will be subtracted from your test score.

1. Suppose one mutual fund charges an annual management fee equal to 1.6% of assets and another fund's annual management fee is 0.2% of assets. If both funds earn 8% a year before management fees, what will be the difference in an investor's wealth after 20 years?

2. Professor Smith was offered two $800,000 interest-only mortgages:
    a. 5.00% APR with 1.50 points.
    b. 5.75% APR with 0.25 points
    Assuming a 5-year horizon, which do you recommend? You don't need to make a specific recommendation; you do need to show the calculations you would do in order to make your recommendation. (Ignore taxes.)

3. You will receive $1,000 twenty years from now. Your annual real required return is 5% and the annual rate of inflation is 5%. Is the real value of this $1,000 larger than, smaller than, or equal to the present value of this $1,000?

4. What is wrong with this Markowitz Frontier?

Mean

stocks

T-bills

bonds

Standard Deviation
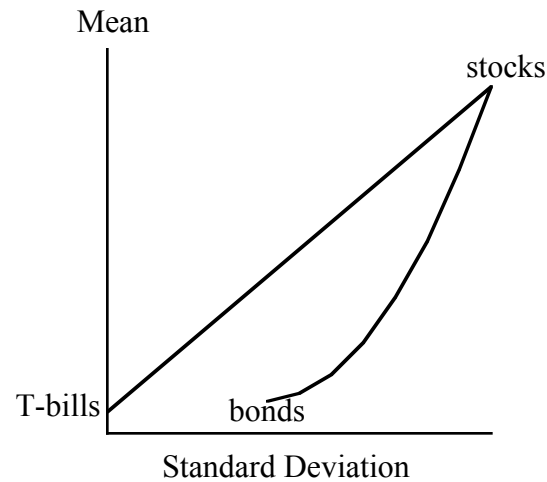
5. When does an asset have two IRRs? (Be sure to define the IRR.)

6. An investment advisory service argued that the Ratio of the price of gold to the price of silver always returns to the range between 34-to-1 and 38-to-1. Suppose that a gold futures contract with a delivery date one year from today is selling for $800/ounce and a silver futures contract with the same delivery date is selling for $16/ounce. If you want to bet that the Ratio will be in its historical range on the delivery date, would you buy gold futures and sell silver futures, or do the reverse? What ratio of gold contracts to silver contracts should you use to ensure you will make a profit if the Ratio is less than 800/16 on the delivery date?

7. In 1986, the Korea Fund, a closed-end investment company that invests in Korean stocks, had 5 million shares outstanding with a net asset value of $18 and a market price of $32, a 78% premium over NAV. The Korea Fund then sold 1.2 million new shares at $32, raising $38.4 million. Did this sale increase or reduce the Korea Fund's NAV? By how much?

8. The interest rate on a 1-year zero is 5%. The yield to maturity on a 2-year bond with 6% coupons (paid annually) is 6%.
   a. Do you think the interest rate on a 2-year zero is less than, greater than, or equal to 6%? Explain your reasoning.

   b. Set up the equations you would use to determine the interest rate on a 2-year zero.

9. Firm A's stock was selling for $20/share and Firm B's stock was selling for $40/share. Then Firm A offered to acquire Firm B by exchanging 2.5 shares of Firm A stock for each share of Firm B stock, and the price of Firm A stock fell to $18/share while the price of Firm B stock rose to $44/share.
   a. Explain how the price of Firm A stock could go down while the price of Firm B stock could go up.

   b. How could an investor bet that this acquisition will occur at a 2.5 exchange ratio, without incurring any market risk; that is, the investor will make money regardless of whether the stock market goes up or down, as long as the acquisition occurs at a 2.5 exchange ratio?

   c. Show that the investor in Part (b) will make money if the price of A stock rises to 20 and the price of B stock rises to 50.

   d. Show that the investor in Part (b) will make money if the price of A stock falls to 16 and the price of B stock falls to 40.

10. Merrill Lynch routinely tracks the characteristics of the stocks in the S&P 500 and has found that stocks with relatively high dividend yields consistently have low projected earnings growth. How do you explain this empirical relationship?

11. The economic value added (EVA) model says that firms create value for stockholders by earning profits that exceed the cost of capital. Suppose that a firm has no debt and that all earnings are paid out as dividends. It has assets A that earn an annual rate of return ρ, and shareholder's required rate of return is R. Which of these equations for the value of the firm is most consistent with EVA analysis? Explain your reasoning.
a. $P = (\rho A - RA)/R$
b. $P = A + (\rho A - RA)/R$
c. $P = A$
d. $P = \text{sum of } (\rho A - RA)$

12. The Federal Home Loan Bank System says that one advantage of Freddie Mac to S&Ls is that, "When interest rates are rising, lenders [S&Ls] can sell off their older, low-interest loans [to Freddie Mac] and reinvest in mortgages at higher interest rates." What is the implicit assumption?

13. CAPM assumes that investors use mean-variance analysis to choose portfolios. If so and investors are risk averse, explain why assets with relatively high expected returns either do or do not have relatively high variances.

14. In February 2006, a Morningstar advertisement stated that, "We know how rare it is for companies to maintain stellar records for long periods of time." Of 1,787 firms in their data base, 954 (53.4%) had increasing free cash flow in the first year of their study; of these 954, only 406 had increasing free cash flow in the second year too; and so on until only 3 firms had increasing free cash flow for 9 consecutive years. If each year's performance is random with each firm having a 53.4% chance of increasing its free cash flow in any given year, regardless of what had happened in previous years, how many of these 1,787 firms would be expected to have increasing free cash flow for 9 consecutive years?

15. A stock currently sells for $50 while a 6-month call option with an exercise price of $55 sells for $3 and a 6-month put option with an exercise price of $45 sells for $2.50. Show the profits as a function of the price of the stock on the expiration date for a "strangle" strategy: buy 1 put and buy 1 call. Use words to describe what kind of wager is being placed.

16. What is wrong with this estimate of the fundamental value of General Electric (GE):

The quarterly dividend has increased from 18¢ a share to 25¢ a share over the past five years, an annual growth rate of 6.7%. The current market price of $35.28 is equal to the present value of dividends only if the required return is a relatively low 7.409%:

$$35.28 = \frac{0.25}{0.07409 - 0.067}$$

However, the current price represents not only the present value of dividends, but also the present value of future capital gains. Therefore, we need to add together the present value of future dividends and the present value of future capital gains. Therefore, the required return is much higher than 7.409%.

18. Rank order the following assets according to how sensitive the market values are to changes in the required return used to discount the cash flows:
   a. 30-year amortized mortgage at a 10% interest rate
   b. 30-year interest-only mortgage at a 10% interest rate
   c. 30-year interest-only mortgage at a 5% interest rate
   d. 30-year zero
   e. 40-year zero

17. Here are some data (millions of dollars) for a hypothetical company:

Assets		Liabilities	
plant and equipment	100	debt	0
		book value of equity	100
Total	100	Total	100

total revenue	25
operating expenses	10
taxes	5
net after-tax income	10
dividends	4
retained earnings	6
rate of return on assets	10%
beta	0.90
shareholder's required return	8%

Assume that the firm's dividends, earnings, and assets are all growing at the same constant rate. Estimate the value of Tobin's q using the dividend-discount model.

19. Municipal bonds are "great if your tax bracket is above 15%." [Jia Lynn Yang, "Your Personal Tax Toolbox," Fortune, June 25, 2007.] Use a numerical example to explain why this advice isn't always right.

20. Mr. Smith is currently 55 years old. He will receive $1,791 in monthly Social Security benefits if he begins collecting benefits at age 66 and $2,407 in monthly benefits if he begins collecting benefits at age 70. (Each of these estimates is in 2007 dollars; Social Security benefits are fully indexed for inflation. Either way, he will continue working and this will not reduce his benefits.) Identify the error(s) in this answer to the question of whether Mr. Smith should begin receiving Social Security benefits at age 66 or 70:

Suppose Mr. Smith lives to age n. He should choose depending on which of these present values is larger:

$$P_{66} = \sum_{t=1}^{n-66} \frac{\$1,791}{(1+R)^t}$$

$$P_{70} = \sum_{t=1}^{n-70} \frac{\$2,407}{(1+R)^t}$$