Notes: 1) "Annuity" and "perpetuity" may have growing or constant cash flows. 2) While you are welcome to solve any problem to a final answer, you will only earn points for setting them up. "Setting up" means writing down the appropriate equations and plugging in the appropriate numbers. For multistep problems, you can plug unsolved variables into later steps. Note however, that some problems will require some calculations for you to figure out how to solve them.

Short Answer (15 points each)

1. Assume that after calculating that the present value of an annuity equals $100, you discover that one of the numbers you used was wrong. After correcting your mistake you find that the true present value of the annuity is greater than $100. Which of the variables might have been incorrect in your first calculation? For each of the possible variables, indicate whether your corrected number is higher or lower than your initial wrong number.

2. Assume that after calculating that the beta of a portfolio of Toyota and Apple equals 1.2, you discover that one of the numbers you used was wrong. After correcting your mistake you find that the true beta was greater than 1.2. Which of the variables might have been incorrect in your first calculation? For each of the possible variables, indicate whether your corrected number is higher or lower than your initial wrong number.

3. What is the fundamental reason that the risk of equity falls as the firm has less debt? Assume perfect capital markets.

4. Assume that after calculating the value of an American call, you discover that one or more of your numbers was wrong. After correcting your mistake, you find that the true value of the option was lower than your first estimate. Indicate whether your corrected numbers for stock price, strike (exercise) price, time to expiration, and standard deviation of returns on the stock are higher or lower than your initial wrong numbers.

5. In your analysis of a new project, you forgot to include changes in accounts receivable. If sales associated with the project increase over the life of the project and accounts receivable are a constant percent of sale, how will correcting your mistake affect the income and cash flows associated with the project?

Problems (75 points each)

1. Assume that a call on AT&T with a strike price of $40 that expires two months from today trades for $0.50 and that an equivalent put trades for $3.75. Assume also that the risk-free interest rate is 1% per year and that AT&T's current stock price equals $37.50. Note: All prices are on a per-share basis.

   a. What set of transactions today will generate an arbitrage profit? What is your profit (per share)?
   b. Show that the conditions are met when the options expire if Proctor & Gamble's stock price ends up at $50 per share and at $25 per share.

2. Assume that the corporate tax rate is 35%, that the personal tax rate on equity income is 15%, and that the personal tax rate on interest income is 40%. Assume also that there is a 25% chance that Dark Knight Capital will have an EBIT of $100,000, a 40% chance that Dark Knight Capital will have an EBIT of $250,000, and a 35% chance that Dark Knight Capital will have an EBIT of $400,000. Determine (rather than just set up the calculations to determine) Dark Knight's optimal level of debt.

Use the following information to answer questions 3 and 4.

Assume that Best Buyback is considering building a new distribution center in Waco at a cost today of $5,000,000. If sales growth exceeds expectations, the facility could be expanded at a cost of $2,000,000 any time over the next three years. If built, the facility will produce its first monthly cash flow of $150,000 eight months from today. After this initial cash flow, cash flows would grow by 1% each. And the expansion, (if it occurs), would produce its first monthly cash flow of $50,000 each one month after the expansion. The cash flows from both the distribution center and the expansion would continue through six years from today.

If sales do not meet expectations, the facility can be sold any time over the next two years for $1,500,000.

The standard deviation of returns on the distribution center is expected to be 45% and the standard deviation of returns on the expansion is expected to be 58%. Both are higher than the 39% standard deviation of returns on Best Buyback's existing assets. The same relationship holds with betas. The expansion is riskiest with a beta of 1.9 and the firm's existing assets is the least risky with a beta of 1.1. The distribution center has a beta of 1.5.

The market risk premium equals 7%.

Assume that the annualized returns on Treasuries vary by maturity as follows:
1-month = 0.051%; 2-months = 0.056%; 3-months = 0.081%; 4-months = 0.101%; 5-months = 0.112%; 6-months = 0.127%; 1-year = 0.191%; 2-years = 0.244%; 3-years = 0.330%; 4-years = 0.502%; 5-years = 0.671%

3. Set up to calculate the net present value of the distribution center if all options are excluded.

4. Set up to calculate the impact of being able to sell the facility if sales fail to materialize on the value of building the distribution center.

5. Assume that the returns on SuperStore's stocks and bonds over the past four years were as follows:

| | Return on: | |
Year	Stock	Bonds
2012	+9%	– 5%
2011	+72%	+13%
2010	+54%	+9%
2009	0%	– 11%

a. Set up to calculate the correlation between the returns on SuperStore's stock and bonds.
b. Assume the market value of SuperStore's stock is $100 million and of SuperStore's bonds is $20 million. Set up the calculations needed to determine the standard deviation of returns on SuperStore's assets?