

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 you have short-sold 100 shares of Apple. What must you do to unwind this short position? What would cause you to have an overall gain on your trades?
2. Assume that the APR on an account equals 5.2% per year with semi-annual compounding. What effective rate per month is equivalent to this rate?
3. Assume that two annuities have the same present value and same initial cash flow. However, the cash flows of Annuity A are growing slower than the cash flows of Annuity B. How does the required return (cost of capital) of Annuity A compare to that of Annuity B?
4. Your boss just came into your office to tell you that by mistake he had included an extra \$5000 of depreciation in the third year of a project you are analyzing. How will fixing this error affect the profits and cash flows associated with the project?
5. Assume you have calculated the covariance between the returns on two stocks. What can you do with this number?
6. What information do you need to calculate the beta of a portfolio?
7. Assume that the bid price for a Proctor & Gamble put with a \$65 strike price is \$2.06 and the ask price for this put is \$2.09. If you submit a market order to buy this put (create a long put) what is your overall profit or loss if Proctor & Gamble’s stock price ends up at \$60.
8. Assume perfect capital markets and that Amazon Taxes reduces its leverage. How does the expected return on Amazon Taxes’ stock change? Why are stockholders indifferent to this change?
9. Management typically knows more about a firm than outside investors. What signal does a debt issue by the firm create as a result of this difference? Note: You do not need to explain why, just what.
10. If we view stock as a call on the firm’s assets, how does a drop in the volatility of the firm’s assets affect the firm’s stockholders if nothing else changes?

Problems (75 points each)

1. Assume that Gold in Sacks’ stock price currently equals \$100 and will equal either \$130 or \$80 one year from today. A call on Gold in Sacks with a \$90 strike price trades for \$20. You have determined that you can duplicate this call by purchasing 0.8 shares of stock and short-selling \$61.5385 of risk-free bonds earning a 4% return.
 - a. What set of transactions will generate an arbitrage profit today? What is your profit?
 - b. Show that the conditions of arbitrage are met if the value of the Gold in Sacks’ stock ends up at \$130 or \$80 one year from today.

2. Given a risk-free rate of 1% and the following returns on Avon and the Standard & Poor's 500, calculate the beta on Avon stock.

	Return on:	
<u>Year</u>	<u>Avon</u>	<u>S&P500</u>
2012	-23%	+3%
2011	-6	+15%
2010	+46%	+38%

Use the following information to answer questions 3 and 4.

Amazon is considering whether to build a new distribution center in Nebraska.

The distribution center will cost \$5,000,000 to build and will begin generating monthly cash flows six months from today that will continue through five years from today. The first cash flow will equal \$100,000 and cash flows grow by 0.4% per month.

If sales exceed expectations, the distribution center can be expanded any time over the next two years at a cost of \$2,500,000. The expansion would generate expected cash flows equal to \$150,000 each month beginning one month after the expansion occurs and ending five years from today. However, if sales fail to materialize, the facility can be sold any time over the next year for \$3,500,000.

The standard deviation of returns on the distribution center is expected to equal 35%. This exceeds the standard deviation of returns on Amazon as a whole which equals 25%, but is less than the standard deviation of returns on the expansion which equals 45%.

The beta of the factory and the expansion will equal 0.7. This exceeds the beta of Amazon as a whole which equals 0.5.

The market is expected to earn 8% per year and the returns on Treasuries vary by maturity as follows: 1-month = 0.012%; 2-months = 0.065%; 3-months = 0.079%; 4-months = 0.094%; 5-months = 0.117%; 6-months = 0.153%; 1-year = 0.187%; 2-years = 0.254%; 3-years = 0.402%; 4-years = 0.593%; 5-years = 0.821%

- Set up the calculations needed to determine the net present value of the facility excluding any options associated with it.
- Set up the calculations needed to determine how the possibility of expanding the distribution facility affects the value of the facility.
- Assume that the tax rate on corporate income equals 20%, on personal equity income equals 10%, and on interest income equals 25%. Assume also that there is a 45% chance that Cantaloupe Computers will earn \$200,000, a 30% chance that Cantaloupe will earn \$500,000, and a 25% chance that Cantaloupe will earn \$900,000. Determine (rather than just set up the calculations to determine) Cantaloupe's optimal level of debt.
- Under what conditions might a firm's stockholders and bondholders disagree over whether a firm should invest in a project? What can bondholders do to protect themselves if these conditions ever arise?

