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)**

Use the following information to answer short-answer questions 1 and 2.

Assume that Lumber Labs Inc. has a 20% chance of earning $1 million a year, a 25% chance of earning $2 million a year, a 30% chance of earning $3 million a year, a 15% chance of earning $4 million a year, and a 10% chance of earning $5 million a year. Lumber Lab’s current interest expense equals $2.5 million per year. The corporate tax rate is 35%, the individual tax rate on dividends and capital gains is 15%, and the individual tax rate on interest income is 30%.

1. Calculate Lumber Labs’ effective tax advantage of debt. (Note: to answer short-answer 2 below, you’ll need to calculate an actual answer to this question).

2. Based on your answer in question 1 above, should Lumber Labs increase or reduce its debt?

3. In prefect markets, why are stockholders indifferent to an increase in the risk they face as a firm increases its leverage?

4. What fundamental factor drives managers to want expend less effort than is optimal for a firm’s stockholders?

5. On average, what percent of pre-bankruptcy value is lost to direct bankruptcy costs?

6. What is one way that debt in a firm’s capital structure helps to resolve conflicts between the firm’s stockholders and managers?

7. Assume a firm with bonds that mature for $5 million has assets that are only worth $3 million when the bonds mature. What positions (short or long) in risk-free bonds and options on the firm’s assets will provide the same payoff as the bond? What are the cash flows from each of these positions (bonds and options) when the bonds mature. Use a “+” for an inflow and a”–“ for an outflow.

8. What is your overall profit or loss (on a per share basis) if you sell a put on Honda Motor Corp that expires on August 19 with a strike price of $40 for $3.30 if Honda’s stock price remains unchanged from its current $36.60 per share? Ignore transaction costs.

Use the following information to answer short-answer questions 9 and 10.

Assume LA Bankruptcy Dodgers Inc. has a current market price of $11 and that by a year from now its stock price will either rise to $14.30 or fall to $8.80. Assume also that the risk-free rate equals 4%. Finally, assume you are planning to calculate the value of a call on LA with a $10 strike price.

9. When solving for the value of the call, what is ?

10. When solving for the value of the call, what is B?

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**Problems (75 points each)**

1. Assume markets are perfect. Assume also that IndyMac and MacIndy have identical assets that will produce cash flows next year of either $5 million or $1 million. IndyMac is funded with only equity that has a market value of $2.5 million. MacIndy (on the other hand) is funded with both equity and debt that matures for $1.1 million next year. MacIndy’s debt has a market value of $1 million and its equity has a market value of $2 million. What set of transactions today would lead to an arbitrage profit? Be sure to show that the conditions of arbitrage are met today and a year from today.

Use the following information to answer problems 2 and 3.

Assume that AAALost Inc. is considering whether to build a new redistribution center in Washington DC. The facility would cost $5 million to build. Two years from today, the new facility is expected to generate a net, after-tax cash flow of $750,000. After this initial cash flow, net cash flows are expected to shrink by 1.5% per year through the facility’s final net cash flow 10 years from today.

If sales rise, AAALost will be able to expand the facility any time over the next 3 years at a cost of $2 million. The present value today of the expected cash flows from this expansion equals $1.5 million. If sales fall more than expected, the facility can be sold over the next 4 years for $3 million. The present value today of the cash flows that the facility will produce over the next 4 years equals $1.7 million.

The standard deviation of returns on the facility will equal 45%. This exceeds the standard deviation of returns on the firm’s existing assets which equals 35%, but is less than the standard deviation of returns on the expansion which equals 55%. The beta of the facility is estimated to be 1.2. This exceeds the beta of the firm’s existing assets which equals 1.1, but is less than the beta of the expansion which equals 1.5.

The market risk premium equals 7% and the annual rate of return on Treasury securities varies by maturity as follows: 1-month = 1%; 1 – year = 1.5%; 2 – year = 2.5%; 3 – year = 3.5%; 4 – year = 4%; 5 – year = 4.25%; 10-year = 4.5%; 20-year = 4.6%; 30-year = 4.65%.

2. Calculate the net present value of the new facility excluding any options associated with the project.

3. Calculate how the possibility of expanding the facility if sales rise affects the value of the project?

4. Use the following information to calculate the beta of Proctor & Gamble (PG) stock and the beta on a put on Proctor & Gamble stock that has a strike price of $55 that expires in 42 days if the risk-free interest rate equals 2%. Assume that Proctor & Gamble’s current stock price equals $60.50, and that the standard deviation of returns on Proctor & Gamble’s stock in the future will be unchanged from the past. Note: Average returns and volatilities (standard deviation of returns) do not need to be calculated since they are given.

Return on:

Year PG S&P500

2011 5% 14%

2010 14% 3%

2009 – 20% – 20%

2008 9% – 13%

Average 2% – 4%

Std. Dev. 15.1% 15.4%