1. You have been asked to analyze the value of equity in a company that has the following features:

- The earnings before interest and taxes is $25 million and the corporate tax rate is 40%. There is no net capital expenditures or working capital requirements, and the earnings are expected to grow 5% a year in perpetuity. The cost of capital of comparable firms is 10%.
- The firm has two types of debt outstanding - 2-year zero-coupon bonds with a face value of $250 million, and bank debt with ten years to maturity and a face value of $250 million. (The duration of this debt is 4 years)
- The firm is in two businesses - food processing and auto repair. The average standard deviation in firm value for firms in food processing is 25%, whereas the standard deviation for firms in auto repair is 40%. The correlation between the businesses is 0.5.
- The riskless rate is 7%.

a. Estimate the inputs to the option pricing model to value equity as an option. (3 points)

\[ S = \]
\[ K = \]
\[ r = \]
\[ t = \]
\[ \sigma^2 = \]

(Use the next page as your worksheet)
2. You are an equity research analyst following oil companies and you are comparing two companies. Company A has oil reserves of 1,000 million barrels, an average development cost of $10 per barrel, and variable costs of $6 per barrel. Company B has oil reserves of 1,000 million barrels, an average development cost of $12 per barrel, and variable costs of $4 per barrel. All the per-barrel costs are in present value dollars, and the current price per barrel of oil is $24.

A. Assuming that both companies have the rights to these reserves for the same length of time (15 years) and the same development lag (2 years), which of these two companies has the more valuable reserves? (3 points)

1. Company A has the more valuable reserves
2. Company B has the more valuable reserves
3. Both reserves will have the same value
4. There is insufficient information to answer this question

B. Now assume that OPEC manages to get its act together and increases oil prices to $26 per barrel; the oil producing nations also decide to use some of their resources to reduce the volatility in oil prices in future periods. If you believe that they will be successful in their endeavor, what would you expect to happen to the value of oil reserves at these two companies? (2 points)

1. The value of the reserves will increase.
2. The value of the reserves will decrease
3. The value of the reserves will be unchanged
4. The value of the reserves may increase or decrease.
3. You are now looking at a bio-technology company which has a patent on a promising drug for treating Alzheimer’s Disease. The drug does not have FDA approval yet and the company has 14 years left on the patent. Estimate the effect of each of the following events on the value of this company: (2 points)

a. The FDA grants approval to the drug.
   - INCREASE
   - DECREASE
   - UNCERTAIN

b. The patent law is changed increasing the patent life to 18 years.
   - INCREASE
   - DECREASE
   - UNCERTAIN

c. A large pharmaceutical company comes up with a patent on a competing drug for Alzheimer’s Disease.
   - INCREASE
   - DECREASE
   - UNCERTAIN

d. The treasury bond rate increases by 2%.
   - INCREASE
   - DECREASE
   - UNCERTAIN
Answer all questions and show necessary work. Please be brief. This is an open books, open notes exam.

1. You have been asked to value Office Help Inc., a private firm providing office support services in the New York area.
   
   • The firm reported pre-tax operating income of $10 million in its most recent financial year on revenues of $100 million. In the most recent financial year, you note that the owners of the business did not pay themselves a salary. You believe that a fair salary for their services would be $1.5 million a year.
   
   • The cost of capital for comparable firms that are publicly traded is 9%. (You can assume that this firm will have similar leverage and cost of capital).
   
   • The firm is in stable growth and expects to grow 5% a year in perpetuity. The tax rate is 40%.
   
   • While the average illiquidity discount applied to private firms is 30%, you have run a regression and arrived at the following estimate for the discount:

   \[
   \text{Iliquidity Discount} = 0.30 - 0.04 \ln (\text{Revenues in millions})
   \]

   Estimate the value of Office Help for sale in a private transaction (to an individual).

   (3 points)
Name:
2. NBC has the rights to televise the Winter Olympics in 2 years, and is trying to estimate the value of these rights for possible sale to another network. NBC expects it to cost $40 million (in present value terms) to televise the Olympics, and based upon current assessments expects to have a Nielsen rating of 15 for the games. Each rating point is expected to yield net revenue of $2 million to NBC (in present value terms). There is substantial variability in this estimate, and the standard deviation in the expected net revenues is 30%. The riskless rate is 5%.

a. What is the net present value of these rights, based upon current assessments?

(1 point)

b. Estimate the value of these rights for sale to another network. (5 points)

(The inputs below are worth 2 points, and the correct estimate of value is worth 3 points)

\[ S = \] 
\[ K = \] 
\[ r = \] 
\[ t = \] 
\[ \sigma = \] 
\[ y = \] 

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1 There are 99.4 million households in the United States. Each rating point represents 1% of roughly 994,000 households.
c. Estimate the likelihood (range) that the Olympics will end up being profitable to whichever network ends up with the rights to it. (1 point)
Spring 1999: Quiz 3

1. You note that HK Inc, a manufacturer of well-known brand name office supplies products is planning on going public. GenericOffice, which is a publicly traded firm that manufactures generic office supplies, is trading at a value to sales ratio of 1.5. Assume that both firms have stable long-term growth rates (in operating earnings) of 5%, costs of capital of 10% and sales to capital ratios of 2.0, and that GenericOffice is fairly priced. If HK Inc has an after-tax operating margin that is 5% higher than GenericOffice’s margin, estimate the value to sales ratio for HK Inc. (4 points)
2. You are trying to value Broken Hill Inc., a gold mining company, with both developed and undeveloped reserves.

- It is anticipated that the developed reserves of the firm will yield 100,000 ounces of gold for the next 5 years, and that the price of gold will remain at the existing level of $300/oz. Broken Hill Inc. has a cost of capital of 9%.

- In addition, the firm has undeveloped reserves containing 500,000 ounces of gold. The up-front cost of developing these reserves is estimated to be $50 million, in present value terms, and the variable cost of extracting an ounce of gold, once the reserves are developed, is estimated to be $200 an ounce in present value dollars. The firm has the rights to the undeveloped reserves for the next 15 years. The development lag is 1 year, and the annual production is expected to be 40,000 ounces of gold, if the reserves are developed.

- The historical standard deviation in gold prices is 20%, but the expected standard deviation, looking forward, in gold prices is 30%. The treasury bond rate is 6%.

a. Estimate the value of the developed reserves. (1 point)
b. Estimate the value of the undeveloped reserves, on a discounted cash flow basis (i.e., with no option value assigned to it) (1 point)

c. Estimate the inputs you would have to the Black-Scholes model, to value these undeveloped reserves as an option. (3 points)

\[ S = \]
\[ K = \]
\[ t = \]
\[ \sigma^2 = \]
\[ r = \]
\[ y = \]
d. Now assume that gold prices drop by $10, but the expected volatility in gold prices increases. Which of the following statements is most likely to describe what will happen to this firm. (1 point)

- The firm will become more valuable, since the volatility has gone up.
- The firm will become less valuable, since it is now a riskier firm.
- The developed reserves will become more valuable, while the undeveloped reserves will become less valuable.
- The developed reserves will become less valuable, while the undeveloped reserves may become less or more valuable.
- The developed reserves will become less valuable, while the undeveloped reserves will become more valuable.
Name:
1. Cool Springs Inc. is a privately owned business that owns a number of small restaurants. The owner of the firm is considering an offer to buy the firm and has asked for your help in evaluating the offer. The income statement for the firm for the most recent year is reported below (in ‘000s):

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$ 5,000</td>
</tr>
<tr>
<td>- Operating Expenses</td>
<td>$ 3,500</td>
</tr>
<tr>
<td>EBIT</td>
<td>$ 1,500</td>
</tr>
<tr>
<td>- Interest Expenses</td>
<td>$ 300</td>
</tr>
<tr>
<td>- Taxes</td>
<td>$ 480</td>
</tr>
<tr>
<td>Net Income</td>
<td>$ 720</td>
</tr>
</tbody>
</table>

The owner did not pay herself a salary last year, but believes that $100,000 would be a reasonable salary for a general manager. The firm is in stable growth, and is expected to grow 5% a year forever (with a 40% reinvestment rate). You estimate the unlevered beta of publicly traded restaurants to be 0.80 and the correlation coefficient with the market to be 50%. The average debt to capital ratio for these firms is 30%, and you believe that Cool Springs will have to operate at close to this average. If the riskfree rate is 6%, the market risk premium is 4% and the cost of debt is 7%, estimate the value of Cool Springs for sale in a private transaction (to an individual who will not be diversified).
2. You are valuing a mining company, with substantial undeveloped reserves. The firm has 100 million shares trading at $25 per share, and $1.5 billion in debt outstanding. The cost of equity for the firm is 12% and the after-tax cost of debt is 5%. If the existing reserves of the firm are expected to generate $300 million in after-tax cash flows each year for the next 10 years, estimate the value being attached to the undeveloped reserves by the market at existing prices. (2 points)
3. You are valuing the equity in a firm with $800 million (face value) in debt with an average duration of 6 years, and assets with an estimated value of $400 million. The standard deviation in asset value is 30%. With these inputs (and a riskless rate of 6%) we obtain the following values (approximately) for d1 and d2.

\[ d_1 = -0.15 \quad d_2 = -0.90 \]

Estimate the default spread (over and above the riskfree rate) that you would charge for the debt in this firm. (4 points)