1. You have been asked to review a valuation of Seria Chemicals, a publicly traded chemical firm, done by a valuation appraisal service. The service used the following estimates of cashflows and discount rates in making their valuation:

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$1,000.00</td>
<td>$1,200.00</td>
<td>$1,440.00</td>
<td>$1,483.20</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$100.00</td>
<td>$120.00</td>
<td>$144.00</td>
<td>$148.32</td>
</tr>
<tr>
<td>Net Cap Ex</td>
<td>$60.00</td>
<td>$72.00</td>
<td>$86.40</td>
<td>$88.99</td>
</tr>
<tr>
<td>FCFF</td>
<td>$40.00</td>
<td>$48.00</td>
<td>$57.60</td>
<td>$59.33</td>
</tr>
<tr>
<td>Terminal Value</td>
<td></td>
<td>$847.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of capital</td>
<td>12.00%</td>
<td>11.00%</td>
<td>10.00%</td>
<td>10.00%</td>
</tr>
</tbody>
</table>

The analyst has assumed that cashflows will grow at 3% in perpetuity after year 3 and used his estimate of year 4 cashflow to compute the terminal value of $847.54 million.

a. Estimate the value of the firm, using the analyst’s estimates of cashflows and costs of capital. (2 points)
b. What return on capital has the analyst assumed in perpetuity? (2 points)

C. If you believe that the firm will earn a return on capital equal to its cost of capital in perpetuity after year 3, what is your estimate of firm value (holding the stable growth rate fixed at 3%)? (3 points)
2. You have been asked to value Siderbank, an Argentine bank, using price to book value ratios. Next year, the bank expects to earn an excess return of 3% on the book equity that it has invested currently and it is in stable growth, with earnings growing at 4% a year in perpetuity.

   a. If the bank expects to maintain its current excess return (of 3%) in perpetuity and the price to book equity ratio is 1.4, estimate the expected return on equity next year (based on this price to book ratio). (3 points)

   b. Now assume that you have run a regression of price to book ratios of banks against returns on equity and a dummy variable for emerging market presence (the dummy variable is set to 1 for emerging market banks and to 0 for developed market banks).

   \[ P/BV = 0.15 + 0.16 \text{ (Return on Equity)} - 0.80 \text{ (Emerging Market Dummy)} \]

   Using the return on equity estimated in part a, estimate the price to book ratio for Siderbank. (Use absolute values in regression – Eg. 15 if ROE is 15%) (2 points)
3. You have been asked to analyze the value of synergy in a merger of two steel companies and have been provided with the following information on the firms:

<table>
<thead>
<tr>
<th></th>
<th>Reliable Steel</th>
<th>Angkor Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$ 800 million</td>
<td>$ 1,000 million</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$ 80 million</td>
<td>$ 100 million</td>
</tr>
<tr>
<td>Return on capital</td>
<td>12.5%</td>
<td>10%</td>
</tr>
<tr>
<td>Expected Growth</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Cost of capital</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

After the merger, the combined firm is expected to have the following synergies:

- The combined firm’s after-tax operating income is expected to increase 10% as a result of economies of scale. Revenue growth will not be affected by the merger.
- The combined firm will be able to reduce its borrowing costs and the cost of capital will decline to 9% after the merger.

a. What is the value of combined firm without synergy? (3 points)
b. What is the value of synergy in this merger? (3 points)
4. Nebula Publishing is a small publisher of science fiction books. Last year, Nebula reported after-tax operating income of $8 million on revenues of $100 million and on book value of capital of $160 million. Nebula is entirely equity funded. The average levered beta of publishing companies is 1.18 and the average debt to equity ratio is for these firms is 30%. The tax rate for all firms is 40%, the riskfree rate is 4.5% and the market risk premium is 4%.

   a. Assuming that Nebula is in stable growth, expected to grow 3% a year in perpetuity, estimate the status quo value of the firm. (3 points)
b. You believe that you can double both the operating income and with it the expected return on capital for the firm in perpetuity and that the optimal debt to capital ratio for the firm is 30%. If the pre-tax cost of debt at the optimal debt ratio will be 6%, estimate the value of control at Nebula. (You can keep growth fixed at 3% when you make this calculation) (3 points)
5. The following questions all relate to real options and option applications in valuation. Each question is worth 1 point.

   a. Option pricing models that were originally developed to value financial options are now used to value real options. In which of the following real options applications is it most appropriate to use conventional option pricing models?
      i. When you can estimate all of the inputs to the option pricing model easily
      ii. When the underlying asset is not traded but the option is traded
      iii. When the underlying asset is traded but the option is not traded
      iv. When both the underlying asset and the option are traded

   b. You are trying to value a telecommunications patent owned by a small telecom company. You have estimated that the net present value of developing the patent today is negative (-$50 million) and that there is substantial uncertainty about both the market potential and the technological costs. Which of the following statements would you not agree with?
      i. It does not make economic sense to develop the patent today
      ii. The patent may still be valuable because of the uncertainty associated with the future
      iii. The value of the patent will increase with the remaining life of the patent
      iv. This patent will be developed sometime over the remaining life

   c. You track gold mining companies and notice that the price of gold has dropped but that gold prices have become much more volatile. What would you expect to happen to gold mining companies?
      i. They will all become less valuable because gold prices are lower
      ii. They will all become more valuable because gold prices are more volatile
      iii. Gold mining companies with more undeveloped reserves will become more valuable relative to gold mining companies with less undeveloped reserves
      iv. Gold mining companies with more undeveloped reserves will become less valuable relative to gold mining companies with less undeveloped reserves
d. You are a consultant to companies on optimal capital structure and are increasingly tired of hearing under levered firms use the argument that they need the financial flexibility (from having excess debt capacity) to not borrow. In which of the following firms would you be most inclined to accept this rationale?

i. Mature business with low excess returns, Easy access to capital markets, Unpredictable investment needs

ii. High excess return business, Easy access to capital markets, Unpredictable investment needs.

iii. High excess return business, Limited access to capital markets, Predictable investment needs.

iv. Mature business with low excess returns, Limited access to capital markets, Unpredictable investment needs

v. High excess return business, Limited access to capital markets, Unpredictable investment needs.

vi. Mature business with low excess returns, Easy access to capital markets, Predictable investment needs

e. The value of equity in a deeply troubled firm with long-term debt is likely to be higher than the value of equity in an otherwise similar deeply troubled firm with shorter-term debt.

i. True

ii. False

f. Firms often take projects with negative net present values and justify these actions by arguing that the option to expand into new markets/ businesses is worth so much that the negative net present should not drive the decision. This argument makes the most sense when

i. The negative net present value project is a pre-requisite for the option to expand

ii. The firm has the exclusive right to expand into the new business

iii. There is the potential to earn large and sustainable excess returns in the new business

iv. All of the above

v. None of the above