1. As a regional manager for American Airlines you have recently undertaken a survey of economy-class load factors (the percentage of economy-class seats that are filled with paying customers) on the Chicago-Columbus, Ohio, route that you service. The survey was conducted over five successive months. For each month, data collected include the one-way fare you charge per economy seat, the price charged by rival United Airlines, the average (monthly) per capita income in the combined Chicago-Columbus market, and the average economy-class load factor for both American and United Airlines. Assume that all other factors (the price charged by Southwest Airlines, the number of flights, the size of planes flown, and so on) have remained constant.

<table>
<thead>
<tr>
<th>Month</th>
<th>AA Price</th>
<th>UA Price</th>
<th>Income</th>
<th>AA Load Factor</th>
<th>UA Load Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$110</td>
<td>$112</td>
<td>$2,000</td>
<td>65</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>109</td>
<td>110</td>
<td>1,900</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
<td>112</td>
<td>2,100</td>
<td>70</td>
<td>66</td>
</tr>
<tr>
<td>4</td>
<td>109</td>
<td>111</td>
<td>1,900</td>
<td>70</td>
<td>61</td>
</tr>
<tr>
<td>5</td>
<td>108</td>
<td>110</td>
<td>1,900</td>
<td>68</td>
<td>59</td>
</tr>
</tbody>
</table>

a. On the Chicago-Columbus route, identify the arc price elasticity of demand for American economy seats, the arc income elasticity of demand for American economy seats, and the arc cross-price elasticity of demand for American economy seats with respect to United prices.

b. Based on the data that you have collected, is United a substitute or complement for American in the Chicago-Columbus market? Explain your answer.

c. Are American’s economy seats a normal or inferior good in the Chicago-Columbus market? Explain your answer.

d. Would the estimated demand elasticity for your product be larger or smaller if consumers had been given more time to respond to any price change (for example, one year versus one month)?

e. Compared with the price elasticity of demand for American and United economy seats, is the demand elasticity for economy seats in general in the Chicago-Columbus market (regardless of which airlines provide them) larger or smaller?

(20%)
2. Diamonds clearly satisfy less important needs than water, which is essential to life. Yet according to market prices, the essential commodity, water, is worth less than the less essential commodity, diamonds. Why would a vital commodity such as water sell for so much less than diamonds? Does this imply that there is something wrong with a market system that values diamonds more than water? Explain using demand and supply curves for water and diamonds. In your explanation, distinguish between the marginal and total benefit of the two commodities.

(15%)

3. A firm faces known technology with a production function \( Q = 100K^{0.75}L^{0.25} \). Five of the possible input combinations that would yield an output level of 1,000 are shown in the table below.

<table>
<thead>
<tr>
<th>Capital K</th>
<th>Labor L</th>
<th>Output Q</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>4</td>
<td>1,000</td>
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</tr>
<tr>
<td>10</td>
<td>10</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>25</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>1,000</td>
<td></td>
</tr>
</tbody>
</table>

   - What is the minimum cost of producing 1,000 units of output?
   - Suppose demand rises from 1,000 units to 2,000 what is the least cost of meeting the demand in the short-run?
   - What is the firm’s short-run marginal cost of increasing output from 1,000 to 2,000 units?
   - What are the returns to scale properties of this production function? Assuming fixed factor prices, what shape would you expect the firm’s long-run cost curves to be?

(10%)

4. Given the Cobb-Douglas production function \( Q = 100K^{0.75}L^{0.25} \). Obtain expressions for the total cost, average and marginal cost functions if the wage rate and rental rate of capital were 10 per period.

(15%)
5. What is the difference between “investment as the term is used by most people and “investment “ as defined by an economist? Which of the following acts constitute investment according to the economist’s definition?

a. IBM opens a new factory to assemble personal computers.
b. You buy 100 shares of IBM stock.
c. A small computer company goes bankrupt, and IBM purchases its factory and equipment.
d. Your family buys a newly constructed home from a developer.
e. Your family buys an older home from another family.

(10%)

6. You are given the following information about an economy.

\[ C = 0.90 \bar{D}I \]
\[ I = 100 \]
\[ G = 540 \]
\[ (X - IM) = -40 \]
\[ T = (1/3)Y \]

a. Find equilibrium GDP and the budget deficit.
b. Suppose the government, unhappy with the budget deficit, decides to cut government spending by precisely the amount of deficit you found in a. What actually happens to GDP and the budget deficit, and why?
c. Suppose the government, seeing that it has not wiped out the deficit, keeps cutting G until it succeeds in balancing the budget. What levels of GDP will then prevail?

(15%)

7. Use supply and demand diagrams to analyze the effect on the exchange rate between the dollar and the yen if:

a. Japan opens its domestic markets to more foreign competition.
b. Investors come to fear that values on the Tokyo stock market will decline.
c. The Federal Reserve raises interest rates in America.
d. The U.S. government, to help settle the problems of the Middle East, gives huge amounts of foreign aid to Israel and her Arab neighbors.
e. Prospects for inflation in the United States worsen.

(15%)