MGE 302 Assignment #1
Due Thursday, Feb 25 @ Noon (US) and Midnight (Singapore)

- Assignments may be completed individually or in groups of up to 4 people. Only one person from your group needs to upload the completed assignment to UBLearns.

- You may print the assignment and handwrite your work and then scan the completed assignment for submission, or you may type your answers. Please upload a .pdf version of your completed assignment to UBLearns.

1. Jason has long wanted to drive as an independent trucker, but the rental price for the truck Jason wanted is $6,000 per month and that was more than he could afford. For his 30th birthday, Jason’s father bought Jason the truck as a gift. Jason started driving the new truck as an independent trucker and was earning revenues of $18,000 a month with expenses of $13,000 a month (excluding any salary). He was recently bragging to a friend that he was clearing $5,000 a month from his business, which was better than the $4,000 a month he was making as a truck driver for his former employer, Global Shipping.

a. What are Jason’s explicit costs each month?

$13,000

b. What are Jason’s implicit costs each month?

$6,000 + $4,000 = $10,000

c. What is Jason’s economic profit each month? From a purely economic standpoint, evaluate the success of Jason’s business.

$18,000 - $13,000 - $10,000 = -$5000

Jason is not making profit, he is losing $5000 each month.
2. Use the demand curve below to answer the following questions.

![Demand Curve Diagram]

a) Calculate the interval elasticity of demand over the price range $14 to $16.

\[
E = \frac{\Delta Q}{\Delta P} \times \frac{P_{avg}}{Q_{avg}} = \frac{600-350}{14-16} \times \frac{15}{45} = -3.95
\]

b) Calculate the interval elasticity of demand over the price range $2 to $4.

\[
E = \frac{2000-1700}{2-4} \times \frac{3}{1850} = -150 \times \frac{3}{1850} = -0.24
\]

c) If the price of the good is increased from $14 to $16, will total revenue rise or fall?

\[
TR_{14} = 14 \times 600 = 8400
\]

\[
TR_{16} = 16 \times 350 = 5600
\]

[Text: It will fall]

3. One way to encourage people to spend more on preventative health care is to reduce the price of health care to consumers by decreasing the health insurance copayment. At current copayment levels, if the price elasticity of demand for visits to see the doctor is -0.25, by what percentage will the quantity demanded of doctor visits increase is the copayment is decreased from $50 to $25 a visit?

\[
E = \frac{\% \Delta Q}{\% \Delta P}
\]

\[-0.25 = \frac{\Delta Q}{-50} \]

\[
\Delta Q = 0.125
\]

[Text: Increase 12.5%]
5. The general linear demand for good X is estimated to be

\[ Q = 125,000 - 400P - 0.76M + 360P_R \]

Where \( P \) is the price of good X, \( M \) is the average income of consumers who buy good X and \( P_R \) is the price of related good R. The current values of \( M \) and \( P_R \) are expected to be $45,000 and $120, respectively.

a. Write the direct demand function in the form \( Q = a + bP \)

\[
\begin{align*}
Q &= 125000 - 400P - 0.76(45000) + 360P_R \\
&= 125000 - 400P - 34200 + 43200 \\
&= 134000 - 400P
\end{align*}
\]

b. Write the inverse demand function in the form \( P = A + BQ \)

\[
\begin{align*}
P &= \frac{134000 - 400P}{400} \\
&= 335 - 4Q
\end{align*}
\]

\[
\begin{align*}
P &= 335 - 0.0025Q \\
Q &= 67000
\end{align*}
\]

c. Write the equation for marginal revenue and calculate the quantity and price where total revenue is maximized.

\[
\begin{align*}
MR &= 325 - 2(0.0025Q) \\
MR &= 325 - 0.005Q
\end{align*}
\]

\[
\begin{align*}
MR &= 0 \\
325 &= 0.005Q \\
Q &= 65000 \\
P &= 335 - 0.0025(67000) \\
P &= 167.5
\end{align*}
\]

\[
\begin{align*}
E &= \frac{\% \Delta P}{\% \Delta Q} \\
-400 &= \frac{200}{54000} \\
E &= -1.481
\end{align*}
\]

d. If \( P \) is instead set at $200, calculate the quantity of good X demanded and calculate the point price elasticity of demand at this price and quantity.

\[
\begin{align*}
E &= \frac{\% \Delta P}{\% \Delta Q} \\
-400 &= \frac{200}{54000} \\
E &= -1.481
\end{align*}
\]

e. At this point from part d), is demand elastic, inelastic or unitary elastic? Is marginal revenue positive or negative at this point?

Demand is elastic

MR is positive

f. Calculate the income elasticity of demand for this good at the point from part d). Is good X normal or inferior?

\[
\begin{align*}
E &= \frac{M}{Q} \\
&= -0.76 \cdot \frac{45000}{54000} \\
&= -0.63
\end{align*}
\]

\[
\text{inferior because } -0.63 < 0
\]

g. Calculate the effect of a 3.5 percent decrease in income on the demand for good X (all other demand factors being held constant and price = $200).

\[
\begin{align*}
E &= \frac{\% \Delta Q}{\% \Delta P} \\
-0.63 &= \frac{\% \Delta Q}{-3.5} \\
\% \Delta Q &= 2.205
\end{align*}
\]
4. Use the graph below to answer the following questions.

![Graph showing supply and demand curves]

a. What is the equilibrium price and quantity for this market?
   \[ P = \$550 \quad \text{Quantity} = 2500 \]

b. At what price will there be a surplus of 1,250 units?
   \[ \text{At } P = 650 \]

c. At what price will there be a shortage of 1,250 units?
   \[ \text{At } P = 450 \]

d. A large supplier firm exits the market and stops supplying this good. Draw a new supply curve on the graph to represent a market event of this nature. Did equilibrium price increase or decrease?
   \[ \text{Equilibrium price will increase.} \]

e. This economy moves into recession and consumers in this market find their incomes are decreased. If this good is an inferior good, draw a new demand curve on the graph to represent a market event of this nature. Did equilibrium price increase or decrease?
   \[ \text{Equilibrium price will increase.} \]
6. 21st Century Electronics has a theft problem at its warehouse and has decided to hire security guards. The table below shows how the number of security guards affects the number of radios stolen per week.

<table>
<thead>
<tr>
<th>Number of guards</th>
<th>Number of stolen radios per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

If each security guard is paid $200 a week and the cost of a stolen radio is $25, how many security guards should the firm hire?

![Graph showing costs and total costs for each number of guards.]

7. You are interviewing three people for one sales job. On the basis of your experience, you believe Jane can sell 600 units a day, Tom can sell 450 units a day and Kevin can sell 400 units a day. The daily salary each person is requesting is as follows: Jane, $200; Tom, $150; Kevin, $100. How would you rank the three applicants?

<table>
<thead>
<tr>
<th>Name</th>
<th>Units/day</th>
<th>Daily Salary</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jane</td>
<td>600</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>Tom</td>
<td>450</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>Kevin</td>
<td>400</td>
<td>100</td>
<td>1</td>
</tr>
</tbody>
</table>

Kevin is 1st, Jane is 2nd because she can sell more than Tom, while Tom is the least 3rd.