1. **Production possibilities and opportunity costs of missiles and houses**

The table below shows the tradeoff between different combinations of missile production and home construction, *ceteris paribus*.

<table>
<thead>
<tr>
<th>Combination</th>
<th>Number of houses</th>
<th>Number of missiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>K</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>L</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

a. Draw the production possibilities curve illustrating the possible combinations of missiles and houses. Please remember to label all parts of your graph.

b. What is the opportunity cost of moving from point N to point M, in terms of houses?

4 houses
2. Individual demand and supply schedules

Suppose there are three buyers and three sellers in a market as shown in the following individual demand and supply schedules.

<table>
<thead>
<tr>
<th>Price</th>
<th>Alejandro</th>
<th>Ben</th>
<th>Carl</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8.00</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>6.00</td>
<td>12</td>
<td>4</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>4.00</td>
<td>20</td>
<td>4</td>
<td>6</td>
<td>30</td>
</tr>
<tr>
<td>2.00</td>
<td>22</td>
<td>4</td>
<td>6</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Price</th>
<th>Avery</th>
<th>Brandon</th>
<th>Cassandra</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8.00</td>
<td>30</td>
<td>18</td>
<td>22</td>
<td>70</td>
</tr>
<tr>
<td>6.00</td>
<td>16</td>
<td>14</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>4.00</td>
<td>12</td>
<td>6</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>2.00</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

2a. In the above table, if the price is set at $4, the market will: Be in equilibrium (0 units).

2b. In the above table, if the price is $2, the market will: Experience a shortage of 22 units.

2c. In the above table, if the price is set at $8, the market will: Experiences a surplus of 56 units.

2d. In the above table, the equilibrium market quantity is: 30 units.

2e. In the above table, the equilibrium market price is: $4.
3. Utility schedule

a. Complete the table.

<table>
<thead>
<tr>
<th>Quantity consumed</th>
<th>Total utility</th>
<th>Marginal utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>48</td>
<td>3</td>
</tr>
</tbody>
</table>

b. Explain (briefly) why MU is diminishing as quantity consumed increases.

Law of diminishing marginal utility – as quantity consumed increases, each additional unit provides less utility (satisfaction) than the previous unit.
4. Price elasticity of demand

4a. In the figure above, the price elasticity of demand in Graph C is: Relatively inelastic.

4b. Which of the graphs above represents a more elastic response to a price increase for airline travel? B

4c. The price of a laptop fell from $2,000 to $1,500, causing an increase in quantity demanded of 100 to 150. What is the price elasticity of demand for laptops in this market, and what happens to total revenue? Please calculate the precise elasticity and show your work.

\[ E = 1.40, \text{ total revenue increases.} \]

4d. The price of a latte increase from $3 to $4, causing a decrease in quantity demanded of 600 to 500. What is the price elasticity of demand for lattes in this market, and what happens to total revenue? Please calculate the precise elasticity and show your work.

\[ E = 0.63, \text{ total revenue increases.} \]
5. Production costs

   a. Complete the following table.

<table>
<thead>
<tr>
<th>Q</th>
<th>FC</th>
<th>VC</th>
<th>TC</th>
<th>MC</th>
<th>ATC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>2</td>
<td>12</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>5</td>
<td>15</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>15</td>
<td>25</td>
<td>10</td>
<td>8.3</td>
</tr>
</tbody>
</table>

   b. What is the shape of the ATC curve? Explain why this is the case in general.

   U-shaped: falling due to spreading of fixed costs, rising eventually due to increasing variable and marginal costs.

   c. What is the shape of the MC curve? Explain why this is the case in general.

   Eventually increasing due to diminishing productivity: in the short run, all factors except labor are fixed so adding additional workers decreases marginal product (productivity), driving marginal costs up.

   d. Explain (briefly) the relationship between ATC and MC.

   MC intersects ATC at its minimum.  
   If MC>ATC, ATC increases.  
   If MC<ATC, ATC decreases.
6. Perfect competition

In the figure below, graph (a) presents the cost curves that are relevant to a firm's production decision, and graph (b) shows the market-demand and market-supply curves for DVD players.

6a. If the market demand is $D_1$, and the supply curve is $S$, the market price will be:
   A) $P_1$  B) $P_2$  C) $P_3$  D) $P_4$
   Ans: A

6b. If the market demand is at $D_3$, the quantity supplied by the firm will be:
   A) $Q_1$  B) $Q_2$  C) $Q_3$  D) $Q_4$
   Ans: C

6c. Over time, at a price of $P_1$:
   A) Firms will enter the market.  C) Total revenue exceeds average total cost.
   B) Economic profits equal zero.  D) Firms will exit the market.
   Ans: D

6d. If the demand curve is $D_4$, then over time:
   A) Returns to the firm are below average, and firms will exit.
   B) Returns to the firm are above average, and new firms will enter.
   C) There are zero economic profits, and no entry or exit will occur.
   D) Returns to the firm are below average, and new firms will enter.
   Ans: C
7. **Perfect competition II.** Use the figure below to answer questions 7a-7e.

7a. The above figure represents a perfectly competitive firm. If the market price is $30:
   A) The firm should produce 19 units.  
   B) No entry or exit will occur.  
   C) Economic profits will be zero.  
   D) All of the above.  

   Ans: D

7b. The above figure represents a perfectly competitive firm. If the market price is $20:
   A) The firm should produce 19 units.  
   B) There will be economic losses.  
   C) There will be economic profits.  
   D) The firm will expand production.  

   Ans: B

7c. The above figure represents a perfectly competitive firm. If the market price is $46:
   A) The firm should produce 19 units.  
   B) There will be economic losses.  
   C) There will be economic profits.  
   D) Economic profits equal zero.  

   Ans: C

7d. The above figure represents a perfectly competitive firm. This firm earns zero economic profit at a price of:
   A) $8.  
   B) $20.  
   C) $30.  
   D) $46.  

   Ans: C

7e. The above figure represents a perfectly competitive firm. At a market price of $46, the firm will maximize profit at an output of:
   A) 24 units.  
   B) 19 units.  
   C) 15 units.  
   D) 6 units.  

   Ans: A
8. Monopoly

8a. The profit-maximizing level of output for a monopolist is:
   A) 3 units.  B) 4 units.  C) 5 units.  D) 6 units.
   Ans: B

8b. The price charged by a profit-maximizing monopolist is:
   Ans: D

8c. At the profit maximizing level of output for a monopolist, marginal cost is:
   Ans: A

8d. Profit per unit for a profit-maximizing monopolist is:
   Ans: A

8e. If this industry is competitive, the profit-maximizing level of output is:
   A) 3 units.  B) 4 units.  C) 5 units.  D) 6 units.
   Ans: C

8f. If this industry is competitive, the profit-maximizing price is:
   Ans: C
9. Perfect competition versus Monopoly

If the on-campus demand for soda is as follows:

<table>
<thead>
<tr>
<th>Price (per can)</th>
<th>$0.25</th>
<th>0.50</th>
<th>0.75</th>
<th>1.00</th>
<th>1.25</th>
<th>1.50</th>
<th>1.75</th>
<th>2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity demanded (per day)</td>
<td>100</td>
<td>90</td>
<td>80</td>
<td>70</td>
<td>60</td>
<td>50</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>TR</td>
<td>25</td>
<td>45</td>
<td>60</td>
<td>70</td>
<td>75</td>
<td>75</td>
<td>70</td>
<td>60</td>
</tr>
<tr>
<td>MR</td>
<td>-2</td>
<td>-1.50</td>
<td>-1</td>
<td>-0.5</td>
<td>0</td>
<td>0.5</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

and the marginal cost of supplying a soda is 50 cents, what price will students end up paying in.

a. A perfectly competitive market? \( p=mc=\$0.50 \)

b. A monopolized market? \( mr=mc=\$1.75 \)
10. Externalities as market failure

10a. Based on the figure above:
A) There are external costs associated with cigarette smoking.
B) All the costs associated with cigarette smoking are paid by those who smoke.
C) Cigarette smoking results in equity issues.
D) Social costs and private costs for cigarette smoking are equal.
Ans: A

10b. At price \( p_1 \):
A) The market demands 1000 packs of cigarettes.
B) Society desires 1000 packs of cigarettes.
C) The market demand understates the social benefits of cigarette smoking.
D) All of the above.
Ans: B

10c. The market demand curve is to the right of the social demand curve because:
A) There are internal costs associated with cigarette smoking.
B) There are free riders associated with cigarette smoking.
C) The external costs of cigarette smoking are being passed on to those who do not smoke.
D) Positive externalities are being passed on to those who do not smoke.
Ans: C

10d. Briefly describe what it means to “internalize an externality.”

The unification of market and social demand or cost curves, often accomplished through taxes (on negative externalities) or subsidies (on positive externalities).