There are 5 problems on this test. You must answer all of the problems to get full credit. Please read the problems carefully and label all of your graphs. You have 60 minutes to finish this test. Good luck!

1. (10) Draw a perfectly competitive firm’s marginal cost, average variable cost, and average total cost. (2)

\[ P \]
\[ Q \]
\[ P = \text{MC} \]
\[ P = \text{AVC} \]
\[ P = \text{ATC} \]
\[ q^* \]

a. (3) Assume there is a market price that is above zero but below average variable cost. Label the profit maximizing quantity and explain if it depends on whether the fixed costs are sunk or can be recovered. If \( P < \text{AVC} \), then a firm will decide to produce 0 to max profits. This does not depend on whether fixed costs are sunk or can be recovered.

b. (2) Given your answer in a, will there be any entry or exit in this market? Explain. Exit will occur if the market if profits are less than zero. This if a firm like the one above had been in the market, it would exit.

c. (3) Label the profit maximizing quantity if this market is in a long run equilibrium (assuming costs do not change). Explain what it means to be in a long run equilibrium. In a LR equilibrium, economic profits = 0, there is not incentive to enter/exit.
2. (11) Draw a typical marginal cost for a monopolist. Include a market demand and the monopolist's marginal revenue. (2)

\[ P \]
\[ P_0 \]
\[ P_c \]
\[ Q_0 \]
\[ Q_c \]
\[ Q \]
\[ MC \]
\[ MR \]
\[ D \]

a. (2) Explain the shape of the marginal revenue for the monopolist.

Marginal revenue falls twice as fast as demand. You can use a table or calculus to explain this.

\[
\begin{array}{ccc}
Q & P & TR & MR \\
1 & 10 & 10 & 10 \\
2 & 9 & 18 & 8 \\
3 & 8 & 24 & 6 \\
\end{array}
\]

b. (2) Illustrate the profit maximizing quantity and market price for the monopolist.

c. (3) Compare consumer, producer, and total surplus for the monopolist versus a perfectly competitive outcome in this market.

<table>
<thead>
<tr>
<th>Monopoly</th>
<th>P.C.</th>
</tr>
</thead>
</table>
| C.S.     | \( a \) | \( a \) \\
| P.S.     | \( bc \) | \( ce \) if \( b > e \) \\
| Total    | \( abc \) | \( abcde \) \\

d. (2) Given your answer in c, would the government prefer to have a perfectly competitive market or a monopoly market? Explain.

Even though total surplus is less in this static representation of welfare, there are reasons to create monopolies. One example is if the profit is guaranteed, a firm will have the incentive to create a new product to capture the profits.
3. (9) Graph a monopolist with high fixed costs and low, constant marginal costs. Make sure to include demand, marginal revenue, and average total cost. (2)

![Graph of a monopolist with high fixed costs and low, constant marginal costs.](image)

a. (2) Explain the barrier that we commonly associate with this type firm.

The barrier to entry is that any firm expects to earn profits < 0 if it enters. Thus no entry occurs.

(b, 2) Label the profit maximizing quantity, market price, and profit.

c. (3) How would you regulate (by choosing a price) this monopolist to maximize total surplus for society? Make sure to explain how this total surplus is greater than your other options.

Set \( P = ATC = 0 \). If

Price is set by \( MC = MR = 0 \), then profits < 0 and firm would produce zero (T.S. = 0). If you do not regulate at all, T.S. is above MC below demand from \( Q = 0 \) to \( Q = Q_0 \). If \( P = ATC = 0 \), T.S. is above MC and below demand from \( Q = 0 \) to \( Q_1 = Q \). This is the lowest price the firm is willing (profits > 0) produce at; T.S. max outcome.
4. (10) Consider a monopolistically competitive firm.

![Graph showing marginal cost (MC), average total cost (ATC), and demand (D) curves with a point of intersection at \( P_0 \) and \( q_0 \).]

a. (3) Illustrate a marginal cost, average total cost, and firm specific demand for a monopolistically competitive firm in a long run equilibrium. Label the profit maximizing quantity and price.

b. (2) Why is the demand downward sloping for the firm?

   This is a heterogeneous (or differentiated) product. Thus, if a firm raises its price, firm specific demand will not go to zero. Rather, quantity demanded will fall by some amount (law of demand).

c. (2) Explain two factors that would affect the firm specific elasticity of demand.

   Answers could vary. If a good lacks available substitutes, then (ceteris paribus) it would not lose as many customers when \( P \) (more inelastic). Ceteris paribus, if the market demand is more inelastic, each firm's specific demand will be more inelastic.

d. (3) Is the market outcome efficient? Explain.

   At \((P_0, q_0)\), the MC of production > the MB of consumption. Thus, the market outcome is inefficient. This inefficient result occurs because of a downward sloping firm specific demand curve.
5. (5) This program refers to the article that we discussed about EWEB's tier pricing program.
   a. (3) Explain the price discrimination (make sure to explain the degree of price discrimination that it fits best).

   The example is a tiered pricing system where people get charged a higher price for larger blocks of electricity. This fits second degree price discrimination best because people are paying different prices for different quantities.

   b. (2) Explain why this example is different than our normal examples of price discrimination.

   It differs in a few different ways. First, there is a higher price charged for greater quantities as opposed to a price break. Second, there appears to be a motive of encouraging conservation (instead of just profit max). Finally, the price setters appear to be concerned about how much one group of people is paying versus another (elderly, rich, poor, etc.).