A. Multiple choice (57 pts)
Place answers (A, B, C, D or E) ON TEST in the space provided.

1. ___ A ___ If a profit-maximizing monopoly is producing at an output at which marginal cost exceeds marginal revenue, it
   a. Should raise price and lower output.
   b. Should lower price and raise output.
   c. Should lower price and lower output.
   d. Is making losses.
   e. Is maximizing profit.

2. ___ C ___ The production function \( q = L + 2K + 3 \) exhibits which of the following?
   a. Increasing return to scale.
   b. Constant return to scale.
   c. Decreasing return to scale.
   d. Diminishing marginal product of labor.
   e. None of the above.

3. ___ d ___ An decrease in the demand for a good could be caused by:
   a. An increase in income.
   b. An decrease in income.
   c. An decrease in the demand for a close substitute.
   d. All of the above.
   e. None of the above.

4. ___ A ___ Which of the following will definitely cause an increase in the equilibrium quantity?
   a. An increase in both demand and supply.
   b. An decrease in both demand and supply.
   c. An increase in demand combined with a decrease in supply.
   d. A decrease in demand combined with an increase in supply.
   e. None of the above.

5. ___ b ___ The relative prices of bacon to beer \( \frac{P_{\text{bacon}}}{P_{\text{beer}}} \) is 1:3. If Bob’s current consumption is at a level where \( \frac{MU_{\text{beer}}}{MU_{\text{bacon}}} \) is 3:1, then to achieve maximum utility Bob must
   a. Consume more beer and less bacon.
   b. Not change his current consumption of beer and bacon.
   c. Consume less beer and more bacon.
   d. Increase the price of beer.
   e. Consume three times as much beer and one-third as much bacon.

6. ___ C ___ The cost to a maple syrup seller of taking a vacation increases:
   a. When the cost to the seller of buying maple syrup rises.
   b. When other maple syrup sellers reduce the price of their merchandise.
   c. During the summer when most tourists come to town.
   d. When it rains and tourists stay away.
   e. When taxes increase.
7. If the price of fur coats increase by 10 percent and household expenditures on fur coats increase by 10 percent, one can conclude that the price elasticity of demand for fur coats is
   a. elastic.
   b. inelastic.
   c. Unit elastic.
   d. positive.
   e. Not determinable from the information given.

8. which of the following will shift the supply curve for good X leftward?
   a. A decrease in the wages of workers employed to produce X.
   b. An increase in the cost of machinery used to produce X.
   c. A technological improvement in the production of X.
   d. A situation where quantity demanded exceeds quantity supplied.
   e. All of the above.

Question 9-11 are based on the figure 1, which shows the budget constraint and the indifference curves of Sky. Sky is in equilibrium with an income of $300, facing prices $P_x = $4 and $P_y = $10.

Figure 1

9. How much X does Sky consume?
   a. 30
   b. 35
   c. 43
   d. 75
   e. Indeterminable with data provided.

10. If the price of X falls to $2.50, while income and the price of Y stay constant, how much X will Sky consume?
    a. 30
    b. 35
    c. 43
    d. 75
    e. Indeterminable with data provided.
11. The income effect corresponds to the movement from
a. E to F.
   b. E to C.
   c. F to C.
   d. C to E.
   e. Indeterminable with data provided.

12. If all inputs are increased by 10 percent and output increases by less than 10 percent, it must be the case that
   a. Average total cost is decreasing.
   b. Average total cost is increasing.
   c. The LRAC curve is negatively sloped.
   d. There are increasing returns to scale.
   e. There are decreasing returns to scale.

13. The cross elasticity of the demand for white tennis balls with respect to the price of yellow tennis balls is probably
   a. Negative and high.
   b. Negative and low.
   c. Positive and high.
   d. Positive and low.
   e. Zero.

14. Which of the following is not an assumption of perfect competition?
   a. The number of suppliers is large enough that no one produces a significant proportion of the output, and all demanders and suppliers are price-takers.
   b. All individuals have perfect knowledge.
   c. The products sold by all firms in the market are identical.
   d. Each firm faces a downward-sloping demand curve.
   e. All the above are assumptions of perfect competition.

15. The supply curve for an individual firm in a perfectly competitive industry is \( P = 1 + 2Q \). If the industry consists of 100 identical firms, then what is industry supply when \( P = 7 \)?
   a. 300.
   b. 400.
   c. 600.
   d. 800.
   e. None of the above.

16. A firm in a perfectly competitive industry is maximizing its short-run profits by producing 500 units of output. At 500 units of output, which of the following must be false?
   a. MC<AVC.
   b. MC<ATC.
   c. MC>ATC.
   d. AR<ATC.
   e. AR>AVC.
17. \( \text{b} \) When a firm practices price discrimination, we can expect:
   a. The firm to segment consumers based on their preferences and charge them the same price for different goods.
   b. The firm to segment consumers based on their elasticity of demand and charge consumers with an inelastic demand a higher price.
   c. The firm to segment consumers based on their elasticity of demand and charge consumers with an elastic demand a higher price.
   d. The firm to segment consumers based on their elasticity of demand and charge all consumers the same price.
   e. None of the above.

18. \( \text{C} \) Which of the following is true for both perfect competition and single-price monopoly?
   a. Homogeneous product.
   b. Zero long-run economic profits.
   c. Short-run profit-maximizing quantity where \( MC = MR \).
   d. Easy entry and exit.
   e. None of the above.

19. \( \text{C} \) The tax burden on suppliers will be greater the more
   a. Elastic is demand.
   b. Inelastic is demand.
   c. Elastic is supply.
   d. Inelastic is supply.
   a. 2 only.
   b. 1 and 3.
   c. 1 and 4.
   d. 2 and 3.
   e. 2 and 4.

B. (16 pts) (SHOW YOUR WORK) Here is the market for cashew nuts:

<table>
<thead>
<tr>
<th>Price per unit</th>
<th>8</th>
<th>16</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity Demanded</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Quantity Supplied</td>
<td>3</td>
<td>7</td>
<td>11</td>
</tr>
</tbody>
</table>

(a) Find the elasticity of demand at equilibrium. Is the curve elastic here?

\[
P = 32 - 4Q^e \quad \text{or} \quad Q^e = 8 - \frac{1}{4}P \\
S: \quad P = 2 + 2Q^s \quad \text{or} \quad Q^s = \frac{P}{2} - 1 \\
\text{Elasticity:} \quad \frac{dQ}{dP} = \frac{2Q^s}{P} \\
\quad 8 - \frac{1}{4}P = \frac{P}{2} - 1 \quad \Rightarrow \quad P = 12 \quad Q^* = 5 \\
\left| \frac{dQ}{dP} \right| < 1 \Rightarrow \text{elastic}.
\]

(b) At which point will the total profit reach its maximum? (find both \( P \) and \( Q \))

\[\pi = MR - MC \]

\[\text{From } P = 32 - 4Q, \quad MR = 32 - 8Q \]
\[\text{At maximum profit, } MR = MC \]
\[32 - 8Q = 2 + 2Q \quad \Rightarrow \quad Q = 3 \]
\[P = 32 - 4 \times 3 = 20 \]
\[\text{DWL} = \frac{1}{2} \times (20 - 5) \times (5 - 3) = 12\]
(c) Complete this table showing the effects of the following policy:
A S6 tax on consumer

<table>
<thead>
<tr>
<th>Pe</th>
<th>Ps</th>
<th>Qe</th>
<th>Qs</th>
<th>ΔCS</th>
<th>ΔPS</th>
<th>ΔGR</th>
<th>DWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>-18</td>
<td>-9</td>
<td>24</td>
<td>-3</td>
</tr>
</tbody>
</table>

with tax: \( P = 26 - 46d \) or \( 8 = \frac{26}{4} - \frac{1}{4}P \)
new eqn: \( \frac{26}{4} - \frac{1}{4}P = \frac{P}{2} - 1 \)

\( P = 10 \)
\( 8 = 4 \)
\( Pe = 10 + 6 = 16 \)

\( \Delta Q = - (B + C) = - \frac{1}{2} \times (4 + 5) \times 4 = -18 \)
\( \Delta Ps = - (D + E) = - \frac{1}{2} \times (4 + 5) \times 2 = -9 \)

\( \Delta GR = (B + C) = 6 \times 4 = 24 \)

\( DWL = \frac{1}{2} \times (16 - 10) \times 1 = -3 \)

C. (16 pt) Let Total variable cost = \( q^2 + 4q \), Total fixed cost = 16 and Market demand is given by

\( Q_d = 296 - 10P \)

1. In the short run there are 12 identically sized firms in this perfectly competitive industry. Find the equilibrium price, quantity per firm and profit per firm?

\[ \text{Firms: set } P = MC \]
\[ \text{TC} = 8 + 48 + 16, \quad \text{ATC} = 8 + 4 + \frac{16}{8} \]
\[ \text{MC} = 2\delta + 4 \]

\( \Rightarrow \delta = \frac{96}{12} = 8 \)
\( \Rightarrow \delta = \frac{20}{2} - 2 = 8 \)

Industry Supply: \( \Delta Q = 12 \delta = 6P - 24 \)

Equilibrium: \( \Delta Q = \delta^4 \Rightarrow 24P - 6P = 6P - 24 \)

\[ \Rightarrow \delta^4 = 24 \]

2. Suppose there is free entry by as many identically sized firms as want to enter this perfectly competitive industry. What will the long run price, quantity per firm and number of firms be?

Free entry \( \Rightarrow LP \pi = 0, \ P = \min \text{ATC} \)

\[ \min \text{ATC} : \left( \frac{\partial \text{ATC}}{\partial \epsilon} \right) = 1 - \frac{16}{8^2} = 0 \]

\( \Rightarrow \delta = 4 \)
\( P = \text{ATC} = 4 + 4 + \frac{16}{4} = 12 \)

\( \text{ML quantity: } \delta = 296 - 10 \times 12 = 176 \)

\( \# \text{ of firms} = \frac{176}{4} = 44 \)
3. If a monopoly gains control of this industry, what price would it set? How many units would the firm sell and how much profit would this monopoly make?

\[ P = \frac{2q^6}{10} - \frac{8q}{10} \]

\[ MR = \frac{2q^6}{10} - \frac{8q}{5} \]

Monopoly set \( MR = MC \)

\[ \pi = P\sigma = \left(q^2 + 4\sigma + 16\right) \]

From \( \sigma^6 = 2q^6 - 10P \)

\[ \Rightarrow \frac{\sigma^6}{10} = \frac{2q^6}{10} - \frac{8q}{5} = 2\sigma + 4 \]

\[ \Rightarrow \sigma = \frac{12 \sigma}{11} \]

\[ P = \frac{2q^6}{10} - \frac{12q}{110} \]

D. (11 pts) Let production function \( q = L^0K^1, P_L = 1 \) and \( P_K = 16 \)

(a) Find the equation for the long run total cost function ________________

\[ \text{MRS}_L, L = -\text{MR}_{L,K} = -\frac{2L^{-\frac{2}{3}}K}{L^\frac{1}{2}} = -\frac{K}{2L} \]

\[ \text{MRS}_K, K = \frac{P_L}{P_K} \Rightarrow -\frac{L}{2K} = -\frac{1}{16} \Rightarrow L = 8K \]

\[ L = \left(8K\right)^{\frac{3}{2}} \Rightarrow K = \frac{27}{8} \Rightarrow L = 8 \times \frac{27}{8} = 12 \]

\[ \text{LRAC} = L + 16K = 8 + 8 \times 16 = 134 \]

(b) Find the equation for the short run total cost function for \( K = 8 \) ________________

\[ \frac{q}{8} = 8L^\frac{3}{2} \Rightarrow L = \left(\frac{q}{8}\right)^{\frac{2}{3}} = \frac{q^2}{64} \]

\[ \text{SRAC} = L + 16K = \frac{q^2}{64} + 16 \times 8 \]

(c) Find the cheapest way to produce \( q = 64 \) in the long run ________________

\[ \Rightarrow L = 8K \]

\[ S^L = \frac{16}{8} \]

\[ L = \frac{16}{8} = 8 \]

\[ \Rightarrow \frac{L^2}{K} = 64 \]

(d) Find the cheapest way to produce \( q \) in the short run for \( K = 8 \) ________________

\[ \text{min SRAC} \]

\[ SRAC = \frac{\text{SRAC}}{8} = \frac{q}{64} + \frac{128}{8} \]

\[ \text{min SRAC} \Rightarrow \frac{\text{dSRAC}}{d\frac{q}{8}} = \frac{1}{64} \neq -\frac{128}{8^2} = 0 \Rightarrow \frac{q}{8} = 64 \sqrt{2} \]

> Good Luck! > ☺ < Good Luck! > ☺ < Good Luck! > ☺ < Good Luck! >