Section I, Multiple Choice (40 points): Circle the letter in front of the best answer.

1. Producer Surplus can be defined as
   a. the amount by which the quantity demanded exceeds the quantity supplied.
   b. the amount by which the quantity supplied exceeds the quantity demanded.
   c. the value that an individual places on a good in excess of the price of the good.
   d. the income that a firm receives for a good in excess of the firm's reservation price.

2. If supply increases, only one of the following statements is ALWAYS true. Which one?
   a. Consumer surplus will increase.
   b. Consumer surplus will decrease.
   c. Producer surplus will increase.
   d. Producer surplus will decrease.

3. Complete the following sentence concerning the triangle of deadweight loss associated with underproduction of a good: Deadweight loss is the area bounded by
   a. the supply curve, the demand curve, and the quantity transacted.
   b. the supply curve, the demand curve, and the equilibrium price.
   c. the supply curve, the equilibrium price and the vertical axis.
   d. the demand curve, the equilibrium price and the vertical axis.

4. If the federal government were to increase the national excise tax on cigarettes, consumer surplus (for cigarette smokers) would _______ and producer surplus would _______.
   a. increase, increase
   b. increase, decrease
   c. decrease, decrease
   d. decrease, increase

5. When two countries who had not been trading now initiate trade between each other, with Country A exporting apples and Country B exporting bananas,
   a. apple and banana growers in both countries benefit.
   b. apple and banana consumers in both countries benefit.
   c. apple growers in A and banana growers in B benefit.
   d. apple consumers in A and banana consumers in B benefit.

6. Which of the following statements best explains why protectionist legislation is granted?
   a. Protectionism raises a country's average standard of living.
   b. Protectionism reduces a country's average standard of living, but the people who gain from protectionism are always willing to compensate the people hurt by protectionism.
   c. Protectionism reduces a country's average standard of living, but most politicians are unaware of the adverse effects of protectionism.
   d. Firms and labor unions are able to exert substantial political pressure on their legislators.

7. A quota is
   a. a tax on an imported good.
   b. a restriction on the quantity of an imported good.
   c. a quality requirement for imported goods.
   d. all of the above.

8. With labor as the only variable input, when the marginal product of labor begins to fall
   a. the marginal cost of production begins to rise.
   b. the marginal cost of production also begins to fall.
   c. the average product of labor is falling.
   d. the marginal revenue product of labor is rising.
9. If both Labor and Kapital are potential inputs for producing a particular good, and the cost of labor is high relative to the cost of kapital, a profit maximizing firm will
   a. utilize a production process that is labor-intensive.
   b. utilize a production process that is kapital-intensive.
   c. utilize a production process that uses kapital and labor in equal amounts.
   d. copy the "ideal firm" with no regard to the cost of either input.

10. Because an economist considers both the implicit and the explicit costs of production, the concept of "zero economic profit" implies
   a. zero accounting profit.
   b. negative accounting profit.
   c. positive accounting profit.
   d. no relationship to accounting profit.

11. Which of the following equals zero when the firm’s short run output is zero?
   a. Fixed costs
   b. Variable costs
   c. Implicit costs
   d. Accounting costs

12. The vertical difference between a firm’s average total cost and its average variable cost is
   a. its average fixed costs.
   b. its opportunity cost.
   c. its accounting profit.
   d. always zero.

13. The profit maximizing level of output for a competitive firm is that level of output where
   a. average total cost is at a minimum.
   b. average variable cost is at a minimum.
   c. marginal cost is at a minimum.
   d. marginal cost is equal to marginal revenue.

14. If the market price is less than average total cost but greater than average variable cost,
   a. a competitive firm is making positive economic profit and positive accounting profit.
   b. a competitive firm is making negative economic profit, but positive accounting profit.
   c. a competitive firm is making negative economic profit and negative accounting profit.
   d. a competitive firm is making positive economic profit, but negative accounting profit.

15. A perfectly competitive firm will shut down if
   a. it earns too little economic profit.
   b. it earns too little accounting profit.
   c. its market price is less than its marginal cost of production.
   d. its market price is less than its average variable cost.

16. If variable profit is greater than Total Fixed Cost
   a. the firm is making zero economic profit.
   b. the firm is making positive economic profit.
   c. the firm is making negative economic profit, but should stay in business.
   d. the firm is making negative economic profit and should shut down.

Section II, Direct Questions (40 points): Answer each of the following six questions. You will be graded on your best five responses.
A. It was suggested in class that governments often place special taxes (excise taxes) on goods that are INELASTIC in demand. Examples used in class included gasoline and cigarettes. Why would a government place taxes on goods that are inelastic in demand?

Consumers will continue to buy goods that are inelastic in demand, even when they are taxed. So the government taxes these inelastic goods because they know they will be able to collect tax revenue. When goods are elastic in demand, consumer purchases will fall off substantially, and tax receipts would decrease (assuming some sales tax had already existed).

B. On the diagram below, draw as accurately as possible the world equilibrium price. Which country obtains the greatest gain from trade, the low-price exporting country or the high-price importing country? Explain briefly.

C. Explain the difference between each of the following pairs of terms:

1. Fixed and variable costs
   - In the long run, all costs are variable.
   - Some costs are fixed in the short run.

2. Economic profit and accounting profit
   - Economic profit takes opportunity cost into consideration.

3. Short run and long run
   - The short run is that period of time when some costs are fixed. See (1).
D. Explain briefly the law of (eventually) diminishing marginal returns (or "product").

When variable inputs are added incrementally to fixed inputs, the marginal growth in output is initially increasing. But eventually the growth in output, though still positive, begins to diminish. This is where DMP sets in.

E. We have referred to perfectly competitive firms as "price takers". What does it mean for a firm to be a "price taker"?

Firms take the market price as given, and face a perfectly elastic demand curve. The market price is the intersection of market demand with market supply.

F. If a firm's optimal output is generating negative economic profit for the firm, how does it decide whether to shut down or stay in business? Explain well. A diagram may be helpful.

A firm continues to produce so long as the selling price exceeds its average variable costs. $P_0$ is unprofitable, but with positive variable profit the firm can pay partially on its fixed costs. $P_1$ is the lowest price at which the firm will operate. Below $P_1$ (at $P_2$) the firm will shut down.
Section III, Problems (40 points)

A. (15 points): Use the diagram on the right to answer the following questions. $S_0$ is the initial supply curve, intersecting with the demand curve to generate a $24 equilibrium price. The intersection of $S_1$ with the demand curve generates a $30 equilibrium price. Lower-case letters denote area designations.

1. What is the area of consumer surplus at the $30 equilibrium price? $\text{a}$ (1)

2. What is the area of producer surplus at the $30 equilibrium price? $\text{boeh}$ (2)

3. What is the area of consumer surplus at the $24 equilibrium price? $\text{abcd}$ (3)

4. What is the area of consumer surplus at the $24 equilibrium price? $\text{efghi}$ (4)

5. What is the change in consumer surplus if we move from the $24 equilibrium price to the $30 equilibrium price? $\text{b} + \text{fgi}$ (5) $= (1) - (3)$

6. What is the change in producer surplus if we move from the $24 equilibrium price to the $30 equilibrium price? $\text{b} + \text{fgi}$ (6) $= (2) - (4)$

7. Now suppose $S_1$ represents a tax imposed by the government for the purpose of increasing tax revenues. $S_0$ is the initial market supply curve for the industry. Use lower case area designations to answer the following questions:

(a) What is the impact of this tax on consumers (ACS)? $\text{b}cd$ (a)

(b) What is the impact of this tax on producers (APS)? $\text{efg}$ (b)

(c) What is the amount of tax revenue the government will collect? $\text{bcdef}$ (c)

(d) What is the net welfare gain or loss associated with this tax? $\text{-dg}$ (d)

8. On the diagram below, the no-trade price is $12, the free trade price is $8, and the price with a tariff is $10. Using letters for area designations, show (a) the changes in producer and consumer surplus, (b) the tariff revenue, and (c) the net gain or loss associated with the tariff.

(a1) $\Delta \text{PS}$ $+$ $\text{D}$

(a2) $\Delta \text{CS}$ $-$ $\text{EFG}$

(b) TR $+$ $\text{F}$

(b) Net $-$ $(\text{E} + \text{G})$
B. (10 points) Your firm’s cost functions include the following data. Calculate the cost figures for Fixed Cost (FC), Variable Cost (VC), Total Cost (TC), and Marginal Cost (MC).

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<th>Quantity of Output (Q)</th>
<th>Fixed Cost (FC)</th>
<th>Variable Cost (VC)</th>
<th>Total Cost (TC)</th>
<th>Marginal Cost (MC)</th>
<th>Average Total Cost (ATC)</th>
<th>Average Variable Cost (AVC)</th>
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C. (5 points) The Total Cost function \[ TC = Q^2 + 4Q + 100 \] has an associated Marginal Cost function of \[ MC = 2Q + 4 \]. For a market price of $40, find the optimal quantity of output and the profit level for that output.

\[
\begin{align*}
MC &= MR \\
2Q + 4 &= 40 \\
2Q &= 36 \\
Q &= 18
\end{align*}
\]

\[
\begin{align*}
\Pi &= TR - TC \\
&= (18 \times 40) - (18^2 + 4(18) + 100) \\
&= 720 - (324 + 72 + 100) \\
&= 720 - 496 \\
\rightarrow \Pi &= 224
\end{align*}
\]
D. (10 points) A firm's cost information includes the following data. The firm is operating in a perfectly competitive market structure. The industry supply and demand functions (in millions) are estimated as:

\[
Q_s = -40 + 3P \\
Q_d = 200 - 5P
\]

Use the market information and the data below to calculate the profit-maximizing level of output and the amount of economic profit for the firm. Additional columns are provided for you to use as you wish. You need not fill in additional columns, but YOU MUST SHOW YOUR WORK! Use only integer (whole number) quantities, prices and profits.

<table>
<thead>
<tr>
<th>Quantity of Output (Q)</th>
<th>Total Cost (TC)</th>
<th>Marginal Cost (MC)</th>
<th>Average Total Cost (ATC)</th>
<th>Average Variable Cost (AVC)</th>
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<td>27.1</td>
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</tr>
</tbody>
</table>

**Mkt:**

\[
Q_s = Q_d \\
-40 + 3P = 200 - 5P \\
P = 40
\]

**Firm:**

\[
P = 30; Q = 7 \text{ by } MC = MR
\]

\[
\Pi = TR - TC = (7 \times 30) - 196 = 14/
\]

(3) Price **30**

(3) Output **7**

(3) Profit **14**

(1) If the market price fell, at what price would this firm shut down its operations? **24.7**