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

1. If Canada can increase its production of automobiles without decreasing its production of any other good,
a. Canada must be producing at a point outside its production possibilities frontier.
b. Canada must be producing at a point on its production possibilities frontier.
c. Canada must be producing at a point inside its production possibilities frontier.
d. None of the above answers is correct, because increasing the production of one good without decreasing the production of another good is never possible.

2. As production of the horizontal good increases along a concave (curved) Production Possibilities Frontier, the opportunity cost of producing the horizontal good
a. increases.
b. first increases, then decreases.
c. decreases.
d. is constant.

3. If the wheat market is initially in equilibrium and the price of the fuel needed to harvest the wheat crop increases,
a. the price of wheat will decrease.
b. the supply of wheat will decrease.
c. overall farmer profits will increase.
d. the quantity transacted of wheat will increase.

4. A shift in the supply of good A
a. shifts the demand curve for good A, but does not cause a movement along it.
b. neither shifts the demand curve for good A nor causes a movement along it.
c. shifts the demand curve for good A and causes a movement along it.
d. does not shift the demand curve for good A, but does cause a movement along it.

5. Beef and leather are complements (joint products) in production. If concern about health and diet shifts the demand for beef to the left, in the market for leather belts the result will be a
a. higher price and a smaller quantity supplied.
b. higher price and a larger quantity supplied.
c. lower price and a smaller quantity supplied.
d. lower price and a larger quantity supplied.

6. The price elasticity of demand is equal to the
a. change in the quantity demanded divided by the change in price.
b. percentage change in price divided by the percentage change in the quantity demanded.
c. change in price divided by the change in the quantity demanded.
d. percentage change in the quantity demanded divided by the percentage change in price.

7. The marginal product of labor is the change in total product caused by a one-unit increase in
a. the quantity of labor employed, holding all other inputs constant.
b. the quantity of capital employed, holding all other inputs constant.
c. both the quantity of labor and the quantity of capital employed.
d. the wage rate.

8. When a city enacts rent control legislation, the mandated legal rental price is a
a. price ceiling that keeps the rent above the naturally occurring equilibrium rent.
b. price ceiling that keeps the rent below the naturally occurring equilibrium rent.
c. price floor that keeps the rent above the naturally occurring equilibrium rent.
d. price floor that keeps the rent below the naturally occurring equilibrium rent.
9. In a perfectly competitive market, there are
   a. many buyers, but there might be only one or two sellers.
   b. many buyers and many sellers.
   c. many sellers, but there might be only one or two buyers.
   d. only one or two firms that set the price for the others to follow.

10. If the market price in a perfectly competitive industry is below a firm’s minimum average total cost but above the firm’s minimum average variable cost,
   a. the firm is making positive accounting profit and should stay in business.
   b. the firm is making positive economic profit and should stay in business.
   c. the firm is making negative economic profit and should shut down.
   d. the firm is making negative economic profit, but should stay in business.

11. For any of the market structures we have studied, the profit maximizing level of output is
   a. that level of output where marginal cost is equal to marginal revenue.
   b. that level of output where average total cost is at a minimum.
   c. that level of output where average variable cost is at a minimum.
   d. that level of output where marginal cost is at a minimum.

12. If a monopolist is supplying a market that has a downward-sloping, linear demand curve,
   a. the marginal revenue curve is identical to the demand curve.
   b. the marginal revenue curve lies above (to the right of) the demand curve.
   c. the marginal revenue curve lies below (to the left of) the demand curve.
   d. None of the above, because marginal revenue is not necessarily related to demand.

13. If the government regulates a natural monopolist with marginal cost pricing,
   a. the monopolist’s profits would be negative but there would be no welfare loss.
   b. the monopolist’s profits would be negative and there would be a net welfare loss.
   c. the monopolist’s profits would be positive and there would be no welfare loss.
   d. the monopolist’s profits would be positive but there would be a net welfare loss.

14. One characteristic of a monopolistically competitive industry is
   a. a high capital to labor ratio.
   b. substantial barriers to entry.
   c. product differentiation.
   d. a low ratio of fixed costs to variable costs.

15. What is "monopolistic" about a monopolistically competitive industry?
   a. There is only one firm in the industry and the price is “given” for that firm.
   b. There is only one firm in the industry and the price is determined by the market demand.
   c. There are many firms in the industry and the price is “given” for each firm.
   d. There are many firms in the industry, but each firm faces a downward sloping demand.

16. In an oligopolistic industry,
   a. there is only one firm, and it is selling a product with no close substitutes.
   b. there are only a few firms, and actions by any one firm have impacts on the other firms.
   c. there are many firms, all of whom are selling nearly identical products.
   d. there are many firms, all of whom are selling highly differentiated products.

17. The kinked demand curve is a theory that
   a. explains the wide range of price movements for firms in any industry structure.
   b. accounts for the lack of competition among firms in oligopolistic industries.
   c. results in an upward-sloping demand function for firms in oligopolistic industries.
   d. explains price and market share stability for firms in oligopolistic industries.

18. If a city enacts a living wage that exceeds the federal minimum wage, the number of workers hired by the city ______, and the city payroll ______ if demand for labor is ______.
   a. increases, decreases, elastic
   b. increases, increases, inelastic
   c. decreases, increases, inelastic
   d. decreases, increases, elastic
19. If the wage rate is fixed and the marginal revenue product of labor (MRP) shifts to the right,
   a. firms will hire the same number of workers.
   b. firms will hire fewer workers.
   c. firms will hire more workers.
   d. None of the above -- the MRP of labor is unrelated to the hiring decision.

20. In the backward-bending portion of a labor supply curve:
   a. workers increase their quantity of labor supplied in response to an increase in the wage.
   b. workers decrease their quantity of labor supplied in response to an increase in the wage.
   c. workers increase their quantity of labor supplied in response to a decrease in the wage.
   d. workers decrease their quantity of labor supplied in response to a decrease in the wage.

Section II, Direct Questions (40 points): Answer each of the following questions. You will be
   graded on your eight best responses.

1. Draw a diagram that shows a concave (curved) production possibilities frontier between
   hamburgers on the horizontal axis and vegetables on the vertical axis. Be sure to label your
   diagram. Then explain why this diagram exhibits increasing opportunity costs.

   Increasing amounts of the vertical good must be given up to produce more and more of the horizontal good.

2. If the price of pineapples is $7 per bushel on Island A and $4 per bushel on Island B, what
do you predict will happen to the price of pineapples on each island if the islands begin to
   trade with each other?

   The price would decrease on A and increase on B, falling somewhere in between, but not necessarily exactly at $5.50.

3. Discuss completely the relationship between price, elasticity, and total revenue along a
   linear demand curve.

   TR is max at midpoint of demand curve, where elasticity is unit (E=1).
   In the high-price elastic region, P+TR move in opposite directions.
   In the low-price, inelastic region, P+TR move in the same direction.
4. In one day Brandon can either plow 40 acres of land or plant 20 acres, while Christopher can either plow 28 acres of land or plant 7 acres. Calculate the opportunity cost for each person at each task, and determine each person's comparative advantage.

\[
\begin{align*}
OC_B &= \frac{40 \text{ Plow}}{20 \text{ Plant}} = \frac{2}{1} \text{ Plant} = -4 \text{ Plow} \\
OC_C &= \frac{28 \text{ Plow}}{7 \text{ Plant}} = \frac{4}{1} \text{ Plant} = -4 \text{ Plow}
\end{align*}
\]

Brandon should plant, Christopher should plow.

5. What are the assumptions that we make with respect to firms that operate in perfectly competitive market structures?

1. Many buyers, many sellers
2. "Perfect" (readily available) information
3. Ease of entry and exit
4. Homogeneous (standardized) products
5. No one firm can affect the market price.

6. What are the long run implications for a firm that is a natural monopoly that is earning positive economic profit? Begin your analysis with "Profits are being made...”.

1. Profits are being made.
2. No other firms can enter, so at best, the government will regulate.

7. How is the long run analysis for a monopolistically competitive firm different from that of a perfectly competitive firm?

For a P.C. firm, when new firms enter, supply shifts right (increases).

For an M.C. firm, demand shifts left (decreases) for existing firms -- they lose market share.
8. Two firms, A and B, are in competition with one another in an oligopolistic industry. Each must make a decision as to whether to spend a small amount on advertising (Low $$) or a large amount (High $$). Their projected net profits for alternative scenarios are given in the box to the right below. Does Firm A have a dominant strategy? Does Firm B have a dominant strategy? Explain.

<table>
<thead>
<tr>
<th>Firm A's Decision</th>
<th>Low $$</th>
<th>High $$</th>
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</thead>
<tbody>
<tr>
<td>Low $$</td>
<td>A: $80,000</td>
<td>B: $80,000</td>
</tr>
<tr>
<td>High $$</td>
<td>A: $100,000</td>
<td>B: $50,000</td>
</tr>
</tbody>
</table>

Firm B's Decision

- Low $$: A: $80,000, B: $80,000
- High $$: A: $50,000, B: $50,000

Two firms, A and B, are in competition with one another in an oligopolistic industry. Each must make a decision as to whether to spend a small amount on advertising (Low $$) or a large amount (High $$). Their projected net profits for alternative scenarios are given in the box to the right below. Does Firm A have a dominant strategy? Does Firm B have a dominant strategy? Explain.

A has a dominant strategy of going high, no matter what B does.

B does not have a dominant strategy: if A goes low, B goes high + v.v.

9. Circle the market structures that have the following characteristics. Note the following abbreviations: PC = Perfect Competition; MC = Monopolistic Competition.

- The firm’s demand curve is horizontal: [ ] PC [ ] MC Oligopoly Natural Monopoly
- Maximizes profit at Price = Marginal Cost: [ ] PC [ ] MC Oligopoly Natural Monopoly
- Shuts down if Price is less than AVC: [ ] PC [ ] MC Oligopoly Natural Monopoly
- Has a U-shaped Average Total Cost curve: [ ] PC [ ] MC Oligopoly Natural Monopoly

Section III-A, Problems (12 points): The graphs below and on the next page represent the market for U.S. beef. D and S are initial demand and supply conditions for U.S. consumers and producers, with P₀ and Q₀ as the initial equilibrium prices and quantities. Six events are listed that affect the beef market. For each of the situations described, show the impact of the event graphically. Then state the impact on the equilibrium price (Increase, Decrease) and on the quantity transacted (Increase, Decrease). Each case involves a modification of the original graph. Analyze each case independent of each of the other cases.

1. The federal government provides financial assistance to states to encourage more beef consumption by inner-city elementary school children.

   Equilibrium Price: [ ] D

   Quantity Transacted: [ ] D
2. Scientists at Ralston-Purina Feeds discover a new chemical additive that increases average slaughter yield by ten percent.

   Equilibrium Price: \( P \)
   Quantity Transacted: \( Q \)

3. Because of increased fear of "mad cow" disease, a number of large restaurant chains reduce their beef offerings in their menus.

   Equilibrium Price: \( P \)
   Quantity Transacted: \( Q \)

4. The federal government announces a substantial increase in its milk support price level.

   Equilibrium Price: \( P \)
   Quantity Transacted: \( Q \)

5. Excellent weather in the Midwest leads to a huge corn crop and substantially reduced pork prices.

   Equilibrium Price: \( P \)
   Quantity Transacted: \( Q \)

6. Medical research again shows beef consumption to be a leading cause of heart attacks in middle-aged men.

   Equilibrium Price: \( P \)
   Quantity Transacted: \( Q \)
Section III-B, Problems (12 points): You are given supply and demand equations for beef in France and England:

France: \( Q_d = 80 + 2P \)  
\( Q_s = 120 - 6P \)

England: \( Q_d = 60 + 3P \)  
\( Q_s = 150 - 2P \)

1. Calculate the no-trade equilibrium prices and quantities transacted in each country.

(France)
\[
\begin{align*}
80 + 2P &= 120 - 6P \\
8P &= 40 \\
P &= 5 \\
Q &= 90, 90
\end{align*}
\]

(England)
\[
\begin{align*}
60 + 3P &= 150 - 2P \\
5P &= 90 \\
P &= 18 \\
Q &= 114, 114
\end{align*}
\]

2. Suppose the French government were to establish the price of beef at $8 per pound. Is this a price ceiling or a price floor? What would be the outcome in the French beef market? Please explain and provide both numerical and verbal answers.

\[
\begin{align*}
Q_s &= 80 + 2(8) = 96 \\
Q_d &= 120 - 6(8) = 72
\end{align*}
\]

Calculate the elasticity of demand in France at this $8 price.

\[
\varepsilon = -6 \times \frac{8}{72} = -0.88 = -0.667, \text{ inelastic}
\]

3. If Norway and Sweden trade with each other, which country will export beef? France

What will be the world equilibrium price?

\[
(80 + 2P) + (60 + 3P) = (120 - 6P) + (150 - 2P)
\]

\[
140 + 5P = 270 - 8P
\]

\[
P = 10
\]

Calculate the production and consumption levels in each country.

(France)
\[
\begin{align*}
Q_s &= 80 + 2(10) = 100 \\
Q_d &= 120 - 6(10) = 60
\end{align*}
\]

(England)
\[
\begin{align*}
Q_s &= 60 + 3(10) = 90 \\
Q_d &= 150 - 2(10) = 130
\end{align*}
\]

How much beef will be exported (imported)? 40
Section III-C, Problems (8 points): A firm in a perfectly competitive industry has total fixed costs of 100 (TFC = 100). Total variable cost is: \( \text{TVC} = 2Q^2 \). This results in an associated marginal cost function of: \( \text{MC} = 4Q \). Determine the profit maximizing output for the firm and calculate its profit for selling prices of \( P = 40 \), \( P = 30 \), and \( P = 20 \). There are various approaches for solving this problem, but YOU MUST SHOW YOUR WORK. You will not have to calculate profit beyond 12 units.

<table>
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<tr>
<th>Quantity</th>
<th>TFC</th>
<th>TVC</th>
<th>TC</th>
<th>MC</th>
<th>TR</th>
<th>Profit</th>
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</tbody>
</table>

1. Outcome for \( P = 40 \): Quantity produced = 10. Profit = 100

\[ 4Q = 40 \]
\[ Q = 10 \]

2. Outcome for \( P = 30 \): Quantity produced = 7. Profit = 12

\[ 4Q = 30 \]
\[ Q = 7.5 \]

To produce 8, MC = 32 \( \neq P = 30 \)

3. Outcome for \( P = 20 \): Quantity produced = 5. Profit = -50

\[ 4Q = 20 \]
\[ Q = 5 \]

Stay in business: covering variable costs.
Section III-D, Problems (8 points) Now consider the difference between a competitive industry and a monopolist. The following functions represent (a) the market (industry) Supply and Demand for a product, (b) the Marginal Cost function expressed as the “inverse” of the supply function, and (c) the Marginal Revenue function associated with the downward sloping Demand function:

(a) \( Q_s = 20 + P \)  
(b) \( MC = Q - 20 \)  
(c) \( MR = 100 - Q \)

1. Calculate the output and price if the industry were perfectly competitive.

\[
Q_s = Q_d \\
20 + P = 200 - 2P \\
3P = 180 \\
P = 60 \\
Q = 80
\]

2. Calculate the output and price if the industry were monopolized.

\[
\begin{align*}
MC &= MR \\
Q - 20 &= 100 - Q \\
2Q &= 120 \\
Q &= 60 \\
P &= 70
\end{align*}
\]

Reduced output, higher price charged.

BONUS (5 points): Total Cost for the above Marginal Cost function is: \( TC = 0.5 \cdot Q^2 - 20 \cdot Q + 1000 \)

Using your answers from above, calculate the profit level for the perfectly competitive industry and for the monopolist.

\[
\begin{align*}
P(C) &= TR - TC \\
TR &= 4800 \quad (= 60 \cdot 80) \\
TC &= 0.5 \cdot (80)^2 - 20(80) + 1000 \\
&= 3200 - 1600 + 1000 \\
&= 2600 \\
\therefore P(C) &= 2200
\end{align*}
\]

\[
\begin{align*}
P(M) &= TR - TC \\
TR &= 4200 \quad (= 60 \cdot 70) \\
TC &= 0.5 \cdot (60)^2 - 20(60) + 1000 \\
&= 1800 - 1200 + 1000 \\
&= 1600 \\
\therefore P(M) &= 2600
\end{align*}
\]