You have three hours. SHOW WORK where calculations are required. Use lined sheets for your work and essays.

A. Multiple Choice (80 pts) Place (A, B, C, D or E) in the space on the exam paper.

1. [ ] If the both the demand and supply for a good increases:
A. The equilibrium price will rise, but we can't tell if the quantity traded increases or decreases.
B. The equilibrium price will fall, but we can't tell if the quantity traded increases or decreases.
C. The equilibrium quantity will rise, but we can't tell if the equilibrium price increases or decreases.
D. The equilibrium quantity will fall, but we can't tell if the equilibrium price increases or decreases.
E. Both equilibrium price and quantity will increase.

2. [ ] Two goods are substitutes in demand. If there is an increase in the cost of producing one of these goods, what happens in the market for the other good?
A. The price will rise but the quantity traded will fall.
B. The price will rise but the quantity traded will rise.
C. Both the price and quantity traded will rise.
D. Both the price and quantity traded will fall.
E. The price will rise, but we can't tell what happens to the quantity traded.

3. Suppose that we can increase production of a good with very little increase in the cost per unit. This means the product:
A. Has a very inelastic demand curve.
B. Has a very elastic demand curve.
C. Has a very inelastic supply curve.
D. Has a very elastic supply curve.
E. Has inelastic demand and supply curves.

4. The more elastic the supply:
A. The smaller the dead weight loss from a tax.
B. The lower the producer's after tax price. (Pp)X
C. The greater the government earnings from a tax.
D. The higher the consumer's after tax price. (Pc)
E. The less the reduction in quantity caused by a tax.

5. Suppose we replace a price ceiling with an equivalent tax so that the quantity purchased is exactly the same as it was with the old price ceiling. Then:
A. The dead weight loss is larger than the dead weight loss with the price ceiling.
B. The consumer surplus with the tax is larger than the consumer surplus from the price ceiling.
C. The producer surplus is the same with the tax as it was with the ceiling.
D. The producer surplus from the tax is smaller than the producer surplus from the ceiling.
E. The government revenue from the tax is equal to the change in consumer surplus from the ceiling.

If income increases, the budget line will:
A. Become steeper.
B. Become flatter.
C. Shift inward but parallel to the original budget line.
D. Shift outward but parallel to the original budget line.
E. Shift parallel but outward or inward depending on whether the good is normal or inferior.

Marginal utility equals
A. The total utility divided by the price.
B. The total utility divided by the total number of units consumed.
C. The slope of the total utility curve.
D. The slope of the indifference curve.
E. The ratio of the price of X to the price of Y.
8. Ben is maximizing his utility by choosing to buy lots of X but not much Y. This means:
A. Ben gets more utility from 1 unit of X than from 1 unit of Y.
B. Ben gets more utility from 1 unit of Y than from 1 unit of X.
C. The price of X must be greater than the price of Y.
D. The price of Y must be greater than the price of X.
E. The marginal utility from one dollar spent on X must be greater than the MU of one dollar spent on Y.

9. At a point in X, Y space (X and Y are two goods that you desire and X is on the X-axis), the slope of the indifference curve going through this point is flatter (less negative) than the slope of the budget constraint going through this point. This means:
A. You will be able to get more happiness for the same expenditure by giving back some Y to get more X.
B. You will need to increase your income if you want to achieve more happiness.
C. You are not on the Income Consumption Curve.
D. The marginal utility from the last unit of X consumed is greater than the marginal utility from the last unit of Y.
E. The marginal utility of the last dollar spent on X is greater than the MU of the last dollar spent on Y.

10. Suppose X is an inferior good and the price of X changes:
A. You will buy more X if the price of X rises.
B. You will buy less X if the price of X rises.
C. The income effect will be in the same direction as the price change.
D. The substitution effect and the income effect will be in the same direction.
E. The substitution effect will be larger than the income effect.

11. You want to find the cheapest way to produce a certain amount of X when both inputs can vary. The cheapest method will occur:
A. At the minimum point on the short run average variable cost curve.
B. Where the indifference curve is tangent to the budget line.
C. Where the average product of the variable input reaches its peak.
D. Along the output expansion path.
E. Where K/L equals MPK/MPL.

12. The slope of an isoquant
A. Is greater (more negative) than the slope of an isocost for X less than the break even point (K fixed in the short run).
B. Becomes larger (flatter) if K increases and smaller (steeper) if L increases (K on the Y-axis).
C. Is always equal to the ratio of wL/wK. (K on the Y-axis).
D. Is equal to the ratio of output prices along the ICC. X.
E. Is at its minimum point at the break even point. X.

13. Suppose we have a production function that says that if both labour and capital increase by 10%, output increases by only 5%. This means:
A. In the long run, average cost gets smaller and smaller as output increases.
B. We have constant returns to scale.
C. We would have to pay this company a higher price to get them to produce more (even in the long run).
D. For any given price, the more this company produces, the more profit it will make.
E. The supply curve for this company is zero up to the break even price and infinity above that price.

14. When the amount of capital is fixed, the marginal product curve has a positive slope for a certain range of labour. For the output produced with this labour:
A. The average cost curve must have a positive slope.
B. The average variable cost could be rising or falling. (We can't tell)
C. The marginal cost curve must have a positive slope.
D. If fixed cost is greater than zero, then we must be above the break even point.
E. If fixed cost is greater than zero, then we must be below the shut down point.
When $K$ is fixed, a firm in a competitive industry that maximizes profit will stop hiring more workers when the output price:

A. Equals $w_L$ divided by the average product of labour. $\frac{w_L}{\overline{AP}_L}$
B. Equals $w_L$ divided by the marginal product of labour. $\frac{w_L}{MP_L}$
C. Is greater than $w_L$ multiplied by the minimum marginal product of labour.
D. Is greater than the sum of the fixed cost and variable cost. $\frac{w_L}{\overline{MC} + \overline{VC}}$
E. Is greater than the shut down price.

Which of the following is a characteristic of "monopolistic competition"?

A. Companies compete with each other by making their products different from each other (not just by reducing costs).
B. Each company can charge whatever price they want since no other company produces a similar product.
C. Prices keep falling until each firm operates at the minimum point on their short run average cost curves.
D. Each company produces identical products (consumers can't tell each company's products apart).
E. Each company is very large and must monitor other companies before they know how to act.

If each company in a perfectly competitive industry is making profits greater than zero, then:

A. More companies will enter, each company will produce more output and prices will rise.
B. Companies will leave this industry, prices will rise and output per firm will fall.
C. More companies will enter, prices will fall and each company will produce more output than before.
D. More companies will enter, prices will fall and output per firm will rise.
E. More companies will enter, prices will fall and each company will produce less output than before.

Suppose a firm in a perfectly competitive industry is maximizing profit by producing 20 units of output. Which must be FALSE at this point?

A. MC = AC in the short run
B. MC < AC in the short run
C. P < AC
D. P = MC
E. P = AC

Suppose a monopoly is operating at an output where $MC$ is greater than $MR$. To make more profit, the monopoly (which charges the same price to all customers) should:

A. Lower its price to bring in more customers.
B. Raise its price and sell fewer units of output.
C. Increase production but not change the price of output.
D. Lower prices and sell fewer units of output.

If a monopoly is maximizing profit, what must be true about the Average Cost of its output?

A. We are at the minimum point on the short run average cost curve.
B. We are on the average cost curve where it has a positive slope.
C. We are on the average cost curve where it has a negative slope.
D. The average cost curve at this point could have a negative or positive slope or no slope at all.
E. It must be below the marginal cost curve at this point.

Comparative Statics (22 pts) Let the market for carrots Price: $2, 4, 6, 8, 12, \ldots$ etc.,

Quantity Demanded: $30, 18, 6, 4 \ldots$ etc.,

Quantity Supplied: $6, 10, 14, 18 \ldots$ etc.,

B. What are the elasticities of demand and of supply at equilibrium?

$\frac{\Delta Q_d}{Q_d} = \frac{12}{4} = 3$, $\frac{\Delta P}{P} = \frac{6}{2} = 3$; $\overline{e_d} = \frac{2}{1}$, $\overline{e_s} = \frac{1}{1}$

If income rises by 20%, the demand shifts to $Q_d = 50 - 10P$. What is the income elasticity?

$\frac{\Delta Q_d}{Q_d} = \frac{50}{25} = 2$, $\overline{e_d} = \frac{2}{1}$, $\overline{e_s} = \frac{1}{1}$

Complete a table showing the effects of a law which keeps the price of carrots below $2$ per unit.

$\begin{array}{c|c|c|c|c|c|c|c}
\text{Price} & \text{Quantity} & \text{Demand} & \text{Supply} & \text{Excess} & \text{Price} & \text{Units} & \text{Units} \\
$2$ & $6$ & $18$ & $18$ & $0$ & $2$ & $15$ & $15$
\end{array}$
C. Utility (24 pts) Let \( U = 4XY - 2X, (MUx = 4Y - 2, MUy = 4X), I = \$55, P_x = \$9, P_y = \$2 \)

1. \( X = 3, \ y = 14, U = 162 \)  
Find equilibrium \( X, Y \) and \( U \).

2. \( X = 9, \ y = 14, U = 486 \)  
Find the new equilibrium \( X', Y' \) and \( U' \) if \( P_x \) decreases to \$3.

3. \( X = \frac{27}{5}, \ y = \frac{48}{5} \)  
Find the demand equation for \( X \) (Isolate \( X \) on one side of the equation) \( 2Y + 3P_x = 3X + 3P_y \).

4. \( X = \frac{77}{5}, \ y = \frac{48}{5} \)  
Find the intermediate point (both \( X \) and \( Y \) for the same happiness as in (3), but with \( P_x = \$3 \) (HINT: It’s easier to solve for \( X \) first.) \( 162 = 4XY - 2X = 4x(3x+1) - 2x = 2x^2 \)

5. Draw a rough diagram showing the results of #1, #2 with the appropriate indifference curves, budget constraint and ICC curves. Carefully label these and then mark the intermediate point (#4). Also mark the income and substitution effects of the decrease in the price of \( X \).

D. Production (31 pts) Let \( X = (1/2)L^{1/2}K^{1/2}, (MP_L = (1/4)L^{-1/2}K^{1/2}, MP_K = (1/4)L^{1/2}K^{-1/2}), w_L = \$3, w_K = \$27 \)

1. \( T = 3(6X) \cdot 27(\frac{1}{2}X) = 36X \)

2. \( T = 3X^2 + 27(\frac{1}{2}X) = 108 + 3X^2 \)

Find the equation for the short run total cost curve.

3. Complete the table below...

<table>
<thead>
<tr>
<th>POINT</th>
<th>X</th>
<th>K</th>
<th>L</th>
<th>TC</th>
<th>AC</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>9</td>
<td>6</td>
<td>54</td>
<td>324</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>B</td>
<td>9</td>
<td>4</td>
<td>81</td>
<td>351</td>
<td>39</td>
<td>54</td>
</tr>
<tr>
<td>C</td>
<td>6</td>
<td>4</td>
<td>36</td>
<td>216</td>
<td>36</td>
<td>36</td>
</tr>
</tbody>
</table>

4. Point A. Find the cheapest way to produce \( X = 9 \) when both \( L \) and \( K \) are free to vary.

5. Point B. Find the cheapest way to produce \( X = 9 \) when \( K = 4 \) in the short run.

6. Point C. Find the amount of \( X \) that is the cheapest to produce when \( K = 4 \) in the short run.

5. Draw a rough diagram showing all the appropriate isoquants, isocosts and the output expansion path. Label these around the POINTS A, B and C. The purpose of this diagram is to show how these points fit together so show their relationship to each other clearly and carefully.

6. Draw a rough diagram showing all the appropriate average and marginal cost curves (both long run and short run). Carefully label the curves and POINTS A, B and C. The purpose of this diagram is to show how these points fit together so show their relationship to each other clearly and carefully.
E. Industrial Structure (23 pts) Let Variable Cost = X^2 + 4X + 25, Fixed Cost = $39 and Qd = 212 - 5P

\[
\begin{align*}
X &= 12, \\
T &= 12(8 + 2\frac{1}{2}) = 80
\end{align*}
\]

with the above costs. If the price of X is $28, how many X do you produce and what is your profit?

\[
\begin{align*}
P &= 16, \\
X &= 6, \\
T &= 6(16 - 20%) = -28
\end{align*}
\]

In the short run there are 22 identically sized firms in this perfectly competitive industry. Find the equilibrium price, quantity per firm and profit per firm.

\[
\begin{align*}
\hat{p} &= 1 - \frac{1}{X^2}, \\
X &= 5, \\
A C(5) &= 12 + 5(2) = C(5)
\end{align*}
\]

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

\[
\begin{align*}
\hat{p} &= 212 - 5X, \\
\hat{X} &= 212 - 5X = 212 - 5X = 12(5) = 2C(5)
\end{align*}
\]

If a monopoly gained control of this industry, what price will it charge per unit? Explain.

\[
\begin{align*}
AC &= 12(5X^2) = 12(5) = 243.2 \\
\Delta X &= 13(39) = 50.7
\end{align*}
\]

Calculate the dead weight loss caused by this short run.

\[
\begin{align*}
\Delta W &= 13(39) = 50.7
\end{align*}
\]

F. Short Essay (20 pts) Choose one (1) of the following topics for a short (maximum 250 words) essay. Clearly labelled and good quality diagrams will definitely help your essay.

1. Do you think the demand curve for cigarettes is elastic or inelastic? Explain. Because of its elasticity, will increasing taxes on cigarettes:
   - A) Change smoking habits very much? 
   - B) Harm the government: good revenue? 
   - C) Cause much economic damage? Explain your answers to each of these.

2. Some politicians have proposed many plans to give Vancouver more affordable housing. One plan is to make developers build one unit of affordable housing for every two units of "market" housing they build (They can sell "market" housing for any price they want, but a unit of "affordable" housing can only be sold at less than $50,000 per unit). Why is it that a plan like this will have on housing prices in Vancouver? Do you think this plan will help the economy or hurt the economy? Explain.