ECO 100Y – L0201
INTRODUCTION TO ECONOMICS
Midterm Test # 1

LAST NAME __________________________________________

FIRST NAME __________________________________________

STUDENT NUMBER ____________________________________

INSTRUCTIONS:

1. The total time for this test is 1 hour and 50 minutes.
2. This exam consists of three parts.
3. This question booklet has 15 (fifteen) pages.
5. Write with pen instead of pencil.

DO NOT WRITE IN THIS SPACE

<table>
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<th>Part I</th>
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TOTAL _____/100
PART I  (20 marks)

Instructions: Enter your answer to each question in the table.

<table>
<thead>
<tr>
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<th>1</th>
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1. A welder makes $25 an hour and must take two hours off work (without pay) to go to the dentist for a filling. The dentist charges $100. The opportunity cost of the welder’s trip to the dentist is
   A) $50
   B) $100
   C) $125
   D) $150
   E) $175

2. If the legal beer-drinking age is raised from 19 to 21, the equilibrium price and quantity of beer will change such that
   A) price falls, quantity falls
   B) price rises, quantity falls
   C) price falls, quantity rises
   D) price rises, quantity rises
   E) no change in price or quantity occurs

3. The demand curve for apples will remain the same if there is a change in the
   A) hourly wage rate of workers
   B) price of pears
   C) price of apples
   D) households’ knowledge that bananas are a better source of healthful nutrients than apples
   E) income of apple eaters

4. If potatoes are an inferior non-Giffen good, then an increase in the price of potatoes will cause
   A) an increase in the demand for potatoes
   B) a decrease in the quantity demanded of potatoes
   C) a decrease in the demand for potatoes
   D) an increase in the quantity demanded of potatoes
   E) a decrease in money income

5. Beef and hides are complements in production. An increase in demand for hides, ceteris paribus, would cause
   A) a decrease in the price of hides and decrease in demand for beef
   B) a decrease in the price of hides and increase in demand for beef
   C) an increase in the price of hides and decrease in supply of beef
   D) an increase in the price of hides and increase in supply of beef
   E) no change in the price of beef
6. If per capita income decreases by 5 percent and household expenditures on fur coats decrease by 10 percent, one can conclude that the price elasticity of demand for fur coats is
   A) elastic
   B) inelastic
   C) unity
   D) positive
   E) not determinable from the information given

7. The price of apples at a local market rises from $2.95 to $3.05 per kilo, and as a result the quantity of apples that households purchase decreases from 5100 to 4900 kilos/week while the quantity of oranges that households purchase increases from 3950 to 4050 kilos/week. The cross-price elasticity is
   A) -1.33
   B) -0.75
   C) 0.75
   D) 1.33
   E) insufficient information to know

8. Suppose that the tuna fish industry has an upward sloping supply curve. The government now introduces an income tax cut such that disposable incomes increase. As a result, the price of tuna fish falls. We can therefore conclude that tuna fish:
   A) is a normal good
   B) the demand curve for tuna fish is elastic
   C) the demand curve for tuna fish is inelastic
   D) is a substitute good
   E) is an inferior good

9. Assume that an industry has a perfectly inelastic supply curve. The government introduces a specific commodity tax of $2.50 per unit of output. As a result, which one of the following statements would be correct:
   A) the consumer price would increase by $2.50
   B) the consumer price would fall by $2.50
   C) the burden of the tax would fall completely on consumers
   D) the price received by the producer would decrease by $2.50
   E) none of the above

10. If the price of a normal good changes the income effect will
    A) always be larger than the substitution effect
    B) always be smaller than the substitution effect
    C) reinforce the substitution effect
    D) oppose the substitution effect
    E) always be positive
PART II (30 marks)

Instructions: Answer true or false to the following statements and explain your answers in the space provided (if space is not sufficient, continue on the back of the previous page). Draw the appropriate diagram or diagrams to assist your answer. Each question is worth 6 (six) marks. Marks will be given entirely for the explanation.

1. Since the demand curve for cigarettes is highly inelastic, a large per-unit tax on cigarettes will greatly reduce cigarette purchases and bring cigarettes companies to the brink of bankruptcy.

False

If the demand curve for cigarettes is highly inelastic, then an increase in the price of cigarettes will have a relatively small impact on its quantity demanded. Moreover, the more inelastic the demand curve is the more the incidence of the tax will be born by consumers. Therefore, if the demand curve is highly inelastic, after the imposition of the unit-tax cigarette producers will continue selling approximately the same quantity and receiving approximately the same price as before.

This result can be seen in the following diagram where it’s assumed that the demand curve for cigarettes is infinitely inelastic. Initially, consumers pay a price $P_1$ and producers also receive a price $P_1$. The imposition of the unit-tax increases the costs of production and thus the supply curve shifts up by exactly the size of the tax – that is, producers now require a higher minimum price for each package of cigarettes in order to cover this cost increase. In this case, consumers end up paying a higher price $P_2$ (and the increase in price is equal to the unit-tax). Producers, therefore, do not bear any of the cost of the tax since they continue receiving the same price $P_1$ as before. In addition, the quantity transacted in the market remains exactly the same as before the imposition of the tax. Therefore, producers’ profits remain exactly the same as before the imposition of the tax.
2. Rachel consumes only Good A (x-axis good) and Good B (y-axis good). Good A is an income-independent good for Rachel. Rachel's indifference curves are convex to the origin. If the price of good A decreases, the utility-maximizing model will predict that she will buy the same number of units of Good A and more units of Good B.

False

If good A is an income-independent good for Rachel, then changes in income will leave her quantity demanded of good A unchanged. However, a decrease in the price of a good A causes both a substitution effect and an income effect. Therefore, her quantity demanded of good A will change as a result of the change in relative prices independently of any change in real income. It will not, however, change any further because of the income effect. The overall effect, therefore, will be equal to the substitution effect alone. Given that the price of good A decreases, Rachel will consume more of good A (and less of good B) as a result of the substitution effect (and thus the demand curve will have a negative slope). This can be observed in the diagram below.

Initially Rachel consumes a quantity $A_1$ of good A and a quantity $B_1$ of good B. As a result of the change in relative prices (while keeping real income constant), Rachel increases her consumption of good A to a quantity $A_2$ and reduces her consumption of good B to a quantity $B_2$ – this is the substitution effect. As a result of the increase in real income, Rachel’s quantity demanded of good A does not change any further (i.e., remains at a quantity $A_2$) while the quantity demanded of good B increases further to a quantity $B_3$. (Note that in the diagram the quantity $B_3$ is greater than $B_1$, although this does need to be always the case.)
3. Julian purchases only Good A [x-axis good] and Good B [y-axis good]. The income consumption curve for Good A is perfectly inelastic. As a result of a price decrease in Good A, it can be shown that Julian’s demand curve for Good A is also perfectly inelastic.

**False**

If Julian’s income consumption curve for good A is perfectly inelastic, then good A is an income-independent good for him. This means that as his level of income changes, he will continue purchasing the same quantity of good A; but it does not mean that as the price of good A changes he will continue purchasing the same quantity of good A. Indeed, as the price of good A falls, Julian will buy more of good A as a result of the substitution effect only (since the income effect will be nil). His demand curve for good A, therefore, will have the usual negative slope. This can be seen in the following diagram.

Initially Julian consumes a quantity \( A_1 \) of good A. As a result of the change in relative prices (while keeping real income constant), Julian increases his consumption of good A to a quantity \( A_2 \) – this is the substitution effect. As a result of the increase in real income, Julian’s quantity demanded of good A does not change any further (i.e., remains at a quantity \( A_2 \)). Therefore, as the price of good A falls from \( P_1 \) to \( P_2 \), Julian’s quantity demanded increases from \( A_1 \) to \( A_2 \) and his demand curve for good A has a negative slope (i.e., it’s not perfectly inelastic).
4. Bananas are produced with a fixed factor land [T] and a variable factor labour [L]. At the level of labour input where total product is at a maximum, the average product of labour will be equal to the marginal product of labour.

False

AP is increasing as long as MP > AP, and TP is increasing as long as MP > 0. That is, TP would reach a maximum at the level of output where MP = 0. Therefore, if AP were equal to MP at the level of output where TP reached a maximum, then AP would be equal to zero and so would be TP. The statement is wrong. AP is always positive as long as TP > 0, and thus AP = MP at a level of output lower than where TP reaches a maximum.
5. If the price of a movie were to increase by $2.00, Paul would attend the same number of movies after the price increase as before the price increase. Therefore, Paul’s demand curve for movie tickets has unit-elasticity.

\[ \text{False} \]

If Paul continues buying the same quantity of movie tickets when the price of movie tickets increases, then his demand curve for movie tickets is perfectly inelastic. That is, his demand curve is vertical and his price elasticity of demand is zero. Indeed,

\[ \eta = \frac{\% \Delta Q}{\% \Delta P} = 0 \text{ since } \Delta Q = 0. \]
PART III (50 marks)

Instructions: Answer all questions in the space provided (if space is not sufficient, continue on the back of the previous page).

1. (10 marks) A country produces only two goods (Good X and Good Y) using two factors of production (capital and labour). Show in the diagrams below how each of the following five events may affect the production possibilities curve for this country. Briefly explain the reason for any change in the PPC.

   a) There is a decrease in labour endowment through emigration. (2 marks)

   Explanation:
   A decrease in labour endowment represents a reduction in the quantity of resources available for production in the economy. Therefore, the productive capacity of the economy decreases and the PPC shifts inward.

   b) The capital stock of the country increases. (2 marks)

   Explanation:
   An increase in the capital stock represents an increase in the quantity of resources available for production in the economy. Therefore, the productive capacity of the economy increases and the PPC shifts outward.
c) A technological improvement occurs in the industry producing Good X only. (2 marks)

Explanation:
A technological improvement in the X industry will allow the production of a larger output of X employing the same amount of resources as before. That is, given the level of output of good Y, the maximum quantity of good X will be greater than before. Therefore, the productive capacity of the economy increases and the PPC shifts outward at all points except the vertical intercept.

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d) Weather conditions reduce productivity in the Good Y industry and increase productivity in the Good X industry. (2 marks)

Explanation:
In this case, the maximum potential output of good Y will be lower than before while the maximum potential output of good X will be greater than before.

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e) A new environmental regulation requires more labour to be used for each unit of output in both industries. (2 marks)

Explanation:
Since the production of each unit of output requires now a greater quantity of labour, the productive capacity of the economy will decrease and the PPC will shift inward.
2. (12 marks) Suppose the demand and supply for milk is described by the following set of equations:

\[ Q = 600 - 100 P \]  and \[ Q = -150 + 150 P, \]

where \( P \) is price in dollars and \( Q \) is quantity in millions of litres per year.

a) What is the equilibrium price and equilibrium quantity of milk? (2 marks)

\[ D = S \rightarrow 600 - 100 P = -150 + 150 P \rightarrow 250 P = 750 \rightarrow P^* = 3 \]

\[ Q^* = 600 - 100 P^* = 600 - 100 (3) = 300 \]

b) What is the value of the price elasticity of demand at this equilibrium? (2 marks)

\[ \eta = \frac{P_0/Q_0}{\Delta P/\Delta Q} \]

\[ P_0/Q_0 = 3/300 = 0.01 \]

Let's find \( \Delta P/\Delta Q \).

\[ Q = 600 - 100 P \rightarrow 100 P = 600 - Q \rightarrow P = 6 - 0.01 Q \]

Therefore, \( \Delta P/\Delta Q = -0.01 \) and \( \eta = (P_0/Q_0) / (\Delta P/\Delta Q) = 0.01 / (-0.01) = -1 \) (or 1 in absolute value)

c) What will be the quantity transacted in the market if the government sets a price ceiling of $5 a litre? Will there be a shortage or a surplus? How much is this shortage or surplus? (2 marks)

If \( P_C = 5 > P^* = 3 \), then the price ceiling will not be effective. Producers cannot charge a price higher than $5 per litre but they can always charge a price lower than $5, and they will charge the market equilibrium price of $3 per litre. Therefore, there will neither a shortage nor a surplus in the market.
d) What will be the quantity transacted in the market if the government sets a price floor of $4 a litre? Will there be a shortage or a surplus? How much is this shortage or surplus? (2 marks)

If $P_F = 4 > P^* = 3$, then the quantity transacted in the market will be determined by demand conditions.

$$Q_D = 600 - 100 P_F = 600 - 100(4) = 200$$

The quantity supplied at this price will be

$$Q_S = -150 + 150 P_F = -150 + 150(4) = 450$$

and, therefore, there will be a surplus of 250 millions of litres of milk per year.

e) Suppose that the government imposes a $1 tax per litre of milk on dairy farmers. What is the new equilibrium price and quantity? (2 marks)

Before the imposition of the $1 tax per litre, the expression for the supply curve was

$$Q = -150 + 150 P$$

Let's write this expression differently and have $P$ by itself on the left hand side (i.e., let's write $P$ as a function of $Q$ instead of $Q$ as a function of $P$):

$$150 P = 150 + Q \Rightarrow P = 1 + (1/150) Q.$$ 

After the imposition of the tax, the expression for the supply curve becomes:

$$P = 2 + (1/150) Q.$$ 

Given the expression for the demand curve $P = 6 - 0.01 Q$ or $P = 6 - (1/100) Q$, the new equilibrium quantity is:

$$D = S \Rightarrow 6 - (1/100) Q = 2 + (1/150) Q \Rightarrow [(1/100) + (1/150)] Q = 4 \Rightarrow (1/60) Q = 4 \Rightarrow Q^* = 240$$

and $P^* = 6 - (1/100) Q^* = 6 - (1/100) 240 = 6 - 2.40 = 3.60$

f) How much of the unit-tax do consumers pay? How much of the unit-tax do producers pay? (2 marks)

Consumers are paying now a price of $3.60 per litre while producers are receiving a price of $2.60 per litre (that is, the price consumers pay minus the tax). Therefore, consumers are paying a fraction of the tax equivalent to the increase in price they are experiencing (i.e., $0.60) while producers are paying a fraction of the tax equivalent to the decrease in price they are experiencing (i.e., $0.40).
3. **(10 marks)** What can you conclude about the price elasticity of demand in each of the following statements?

   a) “The pizza delivery business in this town is very competitive. I’d lose half my customers if I raised prices by as little as 10%.” **(2 marks)**

   The price elasticity of demand is \(-5\) (or 5 in absolute value).

   \[ \eta = \frac{\% \Delta Q}{\% \Delta P} = \frac{-50\%}{10\%} = -5 \]

   b) “I owned both of the two Jerry Garcia autographed lithographs in existence. I sold one on eBay for a high price. But when I sold the second one, the price dropped a lot.” **(2 marks)**

   The demand for Jerry Garcia autographed lithographs is very inelastic and thus \(\% \Delta P > \% \Delta Q\) (in absolute value) and \(\eta < 1\). Using the formula for the arc elasticity of demand, in this case the \(\% \Delta Q\) is 66.7\%, and thus \(\% \Delta P\) is implicitly assumed to be more than 66.7\%.

   c) “I used to spend 40\% of my income on cafeteria meals, but since the price of cafeteria meals went down I found myself spending 50\% of my income on cafeteria meals.” **(2 marks)**

   If total expenditure on cafeteria meals increases as the price of cafeteria meals decreases, then the elasticity of demand for cafeteria meals is elastic in this segment. That is \(\% \Delta Q > \% \Delta P\) (in absolute value) and thus total expenditure increases as \(P\) decreases.

   d) “My economics professor has chosen to use the Ragan & Lipsey textbook for his class. I have no choice but to buy this book.” **(2 marks)**

   This student demand for Ragan & Lipsey textbook in perfectly inelastic (i.e., vertical demand curve), that is, her price elasticity of demand is zero since \(\Delta Q = 0\) as \(P\) changes.

   e) “The price of coffee has oscillated between $1.00 and $1.25 a cup during the last six months. However, I always spend exactly $10 per week on coffee.” **(2 marks)**

   If total expenditure remains constant as the price of coffee changes, this consumer’s price elasticity of demand is equal to 1 (unit elasticity). That is \(\% \Delta Q = \% \Delta P\) (in absolute value).
4. (5 marks) Rachel consumes only two goods: Good X and Good Y. At the request of her employer, Rachel moves from Low City (where the price of Good Y is low) to High City (where the price of Good Y is high). She suggests to her employer that she get an increase in monthly income to compensate for the increased cost of purchasing Good Y. (Good X, the only other thing she consumes, has the same price in Low City as High City). The employer offers her the following choices:

i) An increase in income that just permits her to buy the same quantity of X and Y in High City as she was buying in Low City;

ii) An increase in income that just permits her to have the same level of satisfaction in High City as she had when living in Low City.

Is the increase in income in option i) the same as / higher than / lower than (circle the correct answer) in option ii)? (1 mark) Explain your answer with the help of a diagram. Place Good X on the horizontal axis. (4 marks)

BL in option i) lies above the BL in option ii). Therefore, the consumer is able to reach a higher indifference curve in option i) and will prefer this option.
(8 marks) John consumes only video games and books. His indifference curves are of the usual form, convex to the origin. Video games cost $10 and books $20 each. John’s income is $100.

a) Placing video games on the vertical axis draw John’s budget line and an indifference curve that illustrates his optimal consumption bundle. Fully label your diagram and indicate all relevant points. You don’t have enough information to know the specific tangency point, so choose one arbitrarily. (2 marks)

![Graph showing budget line and indifference curve]

Butget Line:  
100 = 10 VG + 20 B  
VG = 10 – 2 B

Substitution Effect: Movement from point A to point B  
Income Effect: Movement from point B to point C

b) Now the price of books falls to $10. Draw John’s new budget line. (1 marks)

c) Books are inferior, but not Giffen, goods for John. Draw an indifference curve that illustrates his optimal consumption bundle after the price of books has fallen. Clearly show the substitution and the income effects. (5 marks)

5. (5 marks) The table below shows the volume of steel output from 2000 to 2004. Using the year 2002 as the base year, express these volumes in index numbers. Clearly show in the “Procedure” column the mathematical operation that will result in the index number for each year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume of Steel</th>
<th>Procedure</th>
<th>Index</th>
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<tr>
<td>2000</td>
<td>2,400</td>
<td>(2,400 / 2,500) 100 = 96</td>
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<td>2001</td>
<td>2,200</td>
<td>(2,200 / 2,500) 100 = 88</td>
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<td>2002</td>
<td>2,500</td>
<td>(2,500 / 2,500) 100 = 100</td>
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<tr>
<td>2003</td>
<td>2,800</td>
<td>(2,800 / 2,500) 100 = 112</td>
<td>112</td>
</tr>
<tr>
<td>2004</td>
<td>2,500</td>
<td>(2,500 / 2,500) 100 = 100</td>
<td>100</td>
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