ECON 201 – INTRODUCTION TO MICROECONOMICS Fall 2009

Part I: Multiple Choice Questions. Write your answers on the computer sheet in PENCIL (Total=25 marks).

1. In the economic sense, the cost of something used in production is
   a. **the benefit foregone by not using it in its best alternative use.**
   b. the explicit cost, the same as accountant's cost
   c. the payment actually made to the factor of production.
   d. the same as the tax authorities' definition.
   e. fixed cost and variable cost.

2. Suppose that the price of a complement for a particular good falls, and additionally the prices of the raw materials used to manufacture the good increase. What would you expect to occur in the market for this good?
   a. **The equilibrium price would increase, but the impact on the amount sold in the market would be ambiguous.**
   b. The equilibrium price would decrease, but the impact on the amount sold in the market would be ambiguous.
   c. Both equilibrium price and equilibrium quantity would increase.
   d. Equilibrium quantity would increase, but the impact on equilibrium price would be ambiguous.
   e. Equilibrium quantity would decrease, but the impact on equilibrium price would be ambiguous.

3. If the price elasticity of demand is -0.5, then a 40% price hike will lead to a
   a. 5% drop in quantity demanded.
   b. 15% drop in quantity demanded.
   c. **20% drop in quantity demanded.**
   d. 40% drop in quantity demanded.
   e. 50% drop in quantity demanded.

4. Tina and Brian work for the same recording company. Tina claims they would increase their total revenue by increasing the price of their CDs while Brian claims they would be better off by decreasing the price. We can conclude that
   a. Tina thinks the demand for CDs has price elasticity of zero and Brian thinks price elasticity equals 1.
   b. Tina thinks the demand for CDs has price elasticity equal to 1 and Brian thinks price elasticity equals zero.
   c. Tina thinks the demand for CDs is price elastic and Brian thinks it is price inelastic.
   d. **Tina thinks the demand for CDs is price inelastic and Brian thinks it is price elastic.**
   e. Tina and Brian should find another job and forget about economics.

5. Joe is a tax accountant. He receives $80 per hour doing tax returns. He can type 20 pages per hour. He can hire an assistant who types 10 pages per hour. Which of the following statements is true?
   a. Joe should not hire an assistant because the assistant cannot type as fast as he.
   b. Joe should hire the assistant as long as he pays the assistant less than $80 per hour.
   c. Joe should hire the assistant as long as he pays the assistant less than $60 per hour.
   d. Joe should hire the assistant as long as he pays the assistant less than $40 per hour.
   e. None of the above.

6. At any single output, the height of the demand curve measures
   a. the consumer surplus enjoyed from consuming that unit.
   b. the difference between the buyers' willingness to pay for that unit and the market price.
   c. the profit earned by the seller from the sale of that unit.
   d. the value buyers place on that unit of the good.
   e. the income elasticity of demand.

7. When asked in an interview what she missed the most because of the time she spent training for the Olympics, a rower revealed that she had given up a job that paid $30,000 per year to train full-time. She received a grant of $8,000 per year from Sports Canada, but this could not cover all her training expenses. Her food and rent were $10,000 per year and training expenses were $12,000 per year. What is the annual opportunity cost, expressed in dollars, to this rower of "Going for Gold"?
   a. $12,000.
   b. $30,000.
   c. $34,000.
   d. $45,000.
   e. None of the above.

8. At its current level of output, a perfectly competitive firm's, average variable cost is $8, average total cost is $10, and marginal cost is $9. If the market price is $8, this firm can increase profits by
   a. shutting down production.
   b. decreasing output.
   c. increasing output.
   d. increasing the market price.
   e. not changing output because this firm is at its profit-maximizing position.

9. Currently Joe and Halyna are consuming the same amount of strawberries, but Joe's (straight line) demand curve is much more elastic than Halyna's at the current price. Which statement is true?
   a. **Halyna's consumer surplus exceeds Joe's.**
   b. Any comparison of consumer surplus depends on the price of strawberries.
   c. Halyna's consumer surplus equals Joe's.

d. No statement can be made regarding consumer surpluses.
e. Joe's consumer surplus exceeds Halyna's.

10. A consumer maximizes his total utility when goods A and B are consumed in quantities such that MU_A/MU_B
a. equals the ratio of total utility of A to that of B.
b. equals the ratio of the price of B to the price of A.
c. equals the ratio of the quantities demanded.
d. always equals unity.
e. none of the above

11. A good that has an inelastic demand has that characteristic because as
a. the quantity consumed of it rises, the marginal utility falls slowly.
b. the quantity consumed of it rises, total utility falls quickly.
c. income rises, the marginal utility falls quickly.
d. the quantity consumed of it rises, the marginal utility falls quickly.
e. none of the above.

12. A risk-averse person would regard the expected utility of a fair gamble to be
a. Equal to the utility of the expected value of the gamble.
b. Less than the utility of the expected value of the gamble.
c. More than the utility of the expected value of the gamble.
d. Not related to the utility of the expected value of the gamble.
e. Zero.

13. Which one of the following statements is true?
a. An individual should specialize according to comparative advantage.
b. An individual should specialize according to absolute advantage.
c. An individual should trade with parties that have the same opportunity costs for the goods and services produced.
d. Comparative advantage exists whenever one person engaging in an activity incurs the same costs as some other individual.
e. An individual must be able to produce more of a good or service than someone else before she can have a comparative advantage in the production of that good or service.

14. The problem with monitoring performance in large companies is often referred to as
a. Moral hazard.
b. Adverse selection.
c. Principal-agent.
d. Risk-neutrality.
e. None of the above.

15. Excess capacity in monopolistically competitive firms is caused by

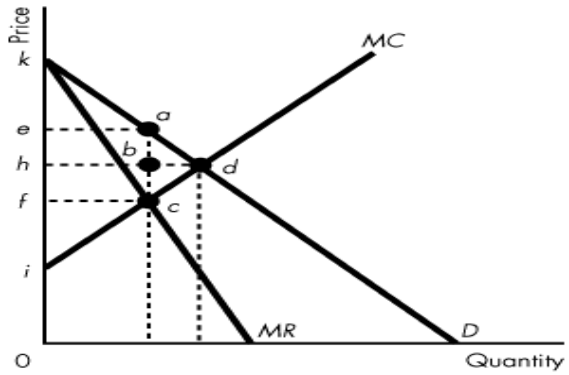
a. The fact that rival firms enter the industry and reduce the demand for the products of the firms already in the industry.
b. The fact that each firm attempts to maximize profits.
c. Cost curves being higher than they are under perfect competition.
d. The waste associated with many slightly differentiated products serving almost the same purpose.
e. **The fact that each firm faces a demand that is not perfectly elastic.**

16. When average total cost is falling, marginal cost must be
a. above average cost.
b. below average cost.
c. constant.
d. above variable cost.
e. below variable cost.

17. If a profit-maximizing firm's marginal revenue is greater than its marginal cost, the firm
a. must be making an economic/supernormal profit.
b. will decrease its output.
c. will increase its output.
d. must be experiencing economic losses.
e. will close down.

18. In the short run, a monopolist with a loss of $50, along with marginal revenue of $15, and marginal cost of $10, should
a. Shut down.
b. Expand output and raise price.
c. Expand output and cut price.
d. Cut output and raise price.
e. Cut output and price.

Figure 1



19. Consider Figure 1. If the industry is operated by a single-price monopolist, what area is producer surplus?
a. kea.
b. ieac.

c. khd.
d. ihd.
e. None of the above.

20. Once a cartel determines the profit-maximizing price,
a. each member will face the temptation to cheat on the cartel price in order to increase its sales and profits.
b. changes in the output of any member firms will have no impact on the market price.
c. entry into the industry of rival firms will raise profits as long as they join the cartel.
d. entry into the industry of rival firms will have no impact on the profit of the cartel.
e. all members of the cartel have a strong incentive to abide by the agreed-upon price.

21. Suppose that the typical firm in a monopolistically competitive industry earns an economic/supernormal profit and new firms enter. This causes:
a. the firm's demand curve to shift to the right.
b. the firm's average total cost curve to shift upward.
c. the industry demand curve to shift to the left.
d. the firm's demand curve to shift to the left.
e. none of the above

		Firm B strategy	
		Low	High
Firm A strategy	Low	600, 600	300, 800
	High	800, 300	400, 400

This table describes the profits accruing to each firm in a game. The first figure in any box is firm A's profit, and the second is firm B's profit. High and low refer to the strategy of having a high or low advertising budget.

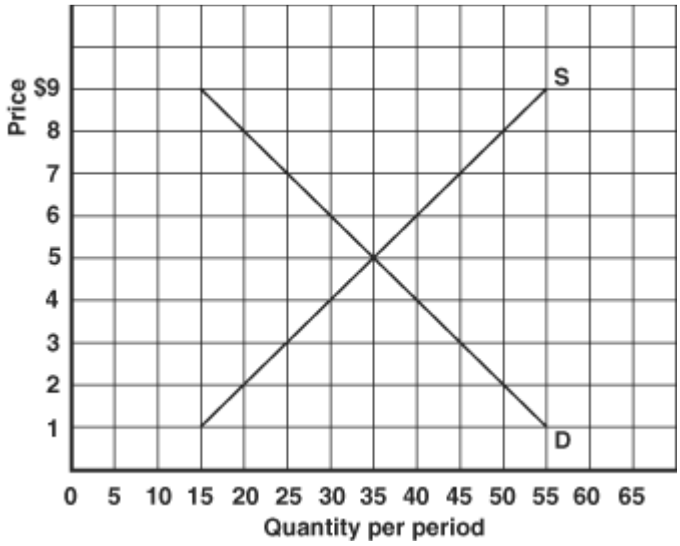
22. Referring to the table above, which of the following statements is correct if B and A reach a secret agreement between themselves concerning advertising budgets and this agreement holds because neither cheats?
a. **Both will have a low advertising budget and both will earn profits of $600**.
b. Both will have a low advertising budget and both will earn profits of $400.
c. Both will have a high advertising budget and both will earn profits of $800.
d. Both will have a high advertising budget and B will earn a profit of $300 and A will earn a profit of $800.
e. None of the above

23. Referring to the table above, which of the following statements is correct if no agreement between B and A is in place and each is considering what to do in terms of its advertising budget?
a. If B adopts a high advertising budget and A does not, then B will earn $300 in profits.

b. If B adopts a high advertising budget and A does not, then A will earn $800 in profits.
c. If A adopts a high advertising budget and B does not, then B will earn $800 in profits.
d. If A and B cannot agree they will go out of business
e. **None of the above.**

	France (euros)	Germany (euros)
Wine	10	20
Generator	10,000	30,000

24. Referring to the table above, which defines the cost of producing wine and generators per unit in France and Germany, we can conclude:
a. France has a comparative advantage in both goods.
b. France has a comparative advantage in wine and Germany has a comparative advantage in generators.
c. Germany has a comparative advantage in wine and France has a comparative advantage in generators.
d. Germany has a comparative advantage in both goods.
e. None of the above statements are true



25. In the figure above, what is the effect of a price ceiling of $6?
a. A shortage of 5 units.
b. A shortage of 10 units.
c. A surplus of 5 units.
d. A surplus of 10 units.
e. **It will have no effect**.

Part II: Answer FOUR of the following five questions. If more than four questions are answered, only the first four will be marked (Total=80 marks).

Question # 1 (20 marks)

Suppose the prices of two goods are Px = $6 and Py = $4, and we observe the consumer to purchase exactly five units of each good.

(i) Graph the resulting budget constraint on a diagram (with good Y on the vertical axis and good X on the horizontal axis), with intercepts clearly marked, explaining how you arrive at the answers. What is the consumer's total income? (4 marks)
Ans: Income = 5*$6 + 5*$4 = $50. Intercepts are y = 50/4 = 12.5; x = 50/6 or 8.33.

(ii) What is the numerical value of the MRS at this equilibrium? (4 marks)
Ans: Px/Py = 6/4 = 1.5.

(iii) Now suppose the government puts a tax on good X of $2 per unit. What is the numerical value of the MRS at the new equilibrium? Explain (6 marks).
Ans: 8/4 = 2. Slope of budget is steeper & equals 2. MRS, the slope of IC, must therefore equal budget line slope if we have an optimum choice.

(iv) Instead of the tax on X, suppose that the government increases the consumer's income by $10. Carefully illustrate on a diagram a possible new equilibrium where the first equilibrium is also illustrated (6 marks).
Ans: An equilibrium above and to the right on a higher indifference curve. Income now is $60, but prices are unchanged. Thus the new budget line is parallel and to the right of the old one.

Question #2 (20 marks)

The table on the left sets out the market demand schedule for tapes, and the table on the right shows the cost structure of a perfectly competitive firm. There are 1000 firms in the industry.

Price	Quantity Demanded
4.4	600,000
5.5	575,000
6.6	550,000
7.4	525,000
8.2	500,000
9	475,000
9.8	450,000
10.6	425,000
11	400,000
12.2	375,000
13	350,000
13.8	325,000
14.6	300,000
15.4	275,000
16.2	250,000

Output(Qs)	MC	AVC	ATC
250	6.6	7.8	21.1
300	7	7	20.6
350	7.7	7.8	20.1
400	11	8.1	17.6
450	11.45	8.9	17.1
500	12.2	9.2	16.6
550	14.6	10	14.6
600	15.05	10.8	14.82

(i) What is the market price? (2 marks)
Ans: P = $11.

(ii) What is the industry's output? (3 marks)
Ans: Q = 400,000.

(iii) What is the output of each firm? (3 marks)
Ans: q = 400.

(iv) What is the economic profit of each firm? (3 marks)
Ans: π = -$2640.

(v) What is the shutdown point (what is the numerical value)? (3 marks)
Ans: AVCmin = $7, at q=300.

(vi) What is the long run equilibrium price? You can assume that the above ATCs apply to both short run and long run (3 marks).
Ans: P = $14.6.

(vii) Continuing from (vi), what is the number (integer) of firms in the industry? (3 marks)
Ans: N = 545, or 545.4545.

Question # 3 (20 marks)
Consider the following:
Demand: $P=110-5Q^d$ Marginal Revenue: $MR=110-10Q^d$
Production Costs: MC=ATC=10 for all output levels

(i) Find the equilibrium price, quantity and profit for a monopolist (3 marks).

Ans: MR=MC, so Q=10, P=60, π=500.

(ii) Suppose there are two firms A and B and each firm produces output Q_1 and Q_2, respectively. In the duopoly game, each firm sets its quantity as follows:
Firm A: $Q_1=(100-5Q_2)/10$
Firm B: $Q_2=(100-5Q_1)/10$
Assume both firms have the same cost functions, and therefore are identical firms. Assume that if the firms collude, they jointly behave as a monopolist. Notice that $Q_1+Q_2=Q^d$, and $P_1=P_2=P$.

(a) Find $Q_1=Q_2$ for each firm in the absence of collusion (round off all values to 2 decimal places) (3 marks).
Ans: Qa=Qb=6.67

(b) Find $P_1=P_2=P$ for each firm (3 marks).
Ans: 43.33, make sure you put in Qa+Qb to find the P.

(c) Find $\pi_1=\pi_2$ for each firm (3 marks).
Ans: π=222.31 for each firm.

(iii) Compare their individual profits under (ii), part (c) with the π under collusion. Should they collude or not? Explain (2 marks).
Ans: If they compete with each other, each earns $222.31. If they cooperate and split the monopoly profits (by cutting back output), then they split $500, which would yield them $250, hence incentives to collude. Collusion means both firms collectively behave as one firm, i.e., as a joint monopolist. Use your results from (i).

(iv) Would you expect these firms to be able to collude and behave like a monopolist, given that explicit written contracts to cut output and raise prices are illegal in Canada? Show that one firm can gain by cheating on the other firm by increasing its own output by 0.1 unit (4 marks). Eventually, what quantities would the firms produce? (2 marks)
Ans: Let Qa=5.1, Qb=5, so firm A is cheating. P=59.5, Q=10.1, and πa=252.45, which means firm A will have incentives to cheat. Replace A with B, firm B will also have incentives to cheat. Notice that as both Q's rise due to cheating, they eventually go back to each producing 6.67 units.

Question # 4 (20 marks)

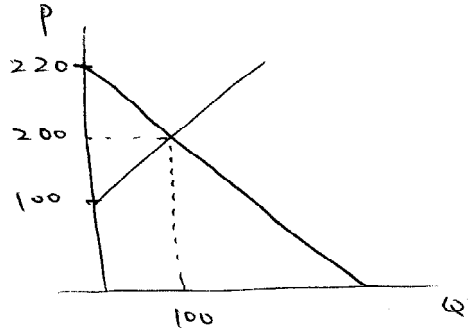
Use the following equations to answer the questions below.

Demand: $Q = 1100 – 5P$

Domestic Supply: $Q = -100 + P$

(i) Find the equilibrium price and quantity if there is no import. (3 marks)

1100-5P = -100+P ➔ P = 200 and Q = 100



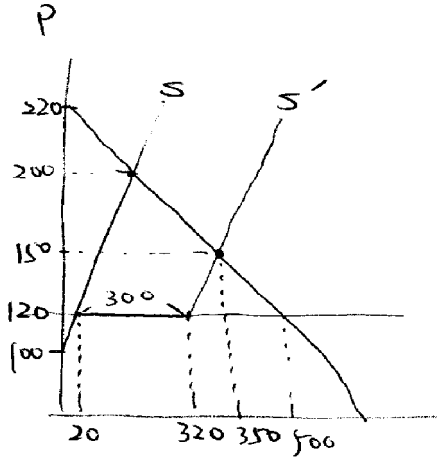
(ii) How much is the consumer surplus? (2 marks)
CS = (220-200)*100/2 = 1000

(iii) How much is the producer surplus? (2 marks)
PS = (200-100)*100/2 = 5000

(iv) Suppose the world price is **120**. If the government imposes an import quota of **600** units in order to protect the domestic producers, under the quota how much is the price in the domestic market? (2 marks)
At P = 120
Quantity supplied by domestic suppliers = 20
Quantity demanded by domestic consumers = 500
Shortage = 480 (=500-20)
Given that the shortage is 480 and the quota is 600, the quota is not effective (does not bind).
The price in the market thus is still 120

(v) How much is the total quantity traded (including the quota and the quantity produced by the domestic producers)? (2 marks)
The quantity traded in the market is 500.

(vi) Suppose the world price is still **120**. Assume that the government now imposes an import quota of **300** units. Under the new quota, how much is the price in the domestic market? (3 marks)



S and S' have the same slope, and S' passes through P = 120 and Q = 320.

➔ S': P = Q – 200
Solving S' (P = Q – 200) and the original demand curve (P = - 0.2 Q + 220) together yields
P = 150 and Q = 350

(vii) How much is the total quantity traded (including the quota and the quantity produced by the domestic producers)? (2 marks)
Q = 350

(viii) How much is the consumer surplus now? (2 marks)
CS = (220-150)*350/2 = 12250

(ix) How much is the "domestic" producers' producer surplus now? (2 marks)
PS = (150-100)*50/2 = 1250

Question # 5 (20 marks)

The following are hypothetical production possibilities tables for Japan and the United States.

Japan's Production Possibilities Table
(Millions of bushels)

	A	B	C	D
Bananas	0	40	80	120
Oranges	30	20	10	0

The United States' Production Possibilities Table
(Millions of bushels)

	A	B	C	D
Bananas	0	20	40	60
Oranges	30	20	10	0

For each line required, plot any two or more points on the line.

(i) Plot Japan's production possibilities curve by plotting at least 2 points on the curve. (2 marks)
Japan's Production Possibilities Curve
An example of two points you could have plotted to define this line are (0,120) and (30,0).

(ii) Plot the United States' production possibilities curve by plotting at least 2 points on the curve on the graph above. (2 marks)
The United States' Production Possibilities Curve
An example of two points you could have plotted to define this line are (0,60) and (30,0).

(iii) What is each country's cost ratio of producing Oranges and Bananas? (4 marks)
Japan
The correct ratio is : 1 orange = 4 bananas.
In Japan, 1 orange must be given up to get 4 bananas. This means that in Japan the domestic cost ratio for the two goods is 1 orange for 4 bananas.

The United States
The correct ratio is : 1 orange = 2 bananas.
In the United States, 1 orange must be given up to get 2 bananas. This means that in the U.S. the domestic cost ratio for the two goods is 1 orange for 2 bananas.

(iv) Which nation should specialize in which product? (3 marks)
Japan should specialize in bananas because Japan has the lowest domestic opportunity cost of bananas.

(v) Plot Japan's trading possibilities curve (by plotting at least 2 points on the curve) if the actual terms of the trade are 1 orange for 3 bananas. (3 marks)
Japan's Trading Possibilities Curve
An example of two points you could have plotted to define this line are (40,0) and (0,120).

(vi) Plot the United States' trading possibilities curve (by plotting at least 2 points on the curve) if the actual terms of the trade are 1 orange for 3 bananas. (3 marks)
The United States' Trading Possibilities Curve
An example of two points you could have plotted to define this line are (30,0) and (0,90).

(vii) Suppose that the optimum product mixes before specialization and trade were C in Japan and B in the United States. What are the gains from specialization and trade? (3 marks)
The correct answer is : 20 bananas and 0 oranges.
Before specialization, Japan produced 80 bananas and 10 oranges, and the United States produced 20 bananas and 20 oranges for a total of 100 bananas and 30 oranges.
After specialization, Japan will specialize in bananas, producing 120 bananas and the United States will specialize in oranges, producing 30 oranges, for a total of 120 bananas and 30 oranges.
The gain in production is the difference between the pre-specialization production and the after-specialization production, which is 20 bananas and 0 oranges.

Part I: Twenty-five (25) Multiple Choice Questions. Write your answers on the computer sheet provided. Please use a PENCIL (Total=25 marks).

1. If the price elasticity of demand is -1.5, then a 30% price hike will lead to a
   a. 15% drop in quantity demanded.
   b. 30% drop in quantity demanded.
   c. 45% drop in quantity demanded.
   d. 60% drop in quantity demanded.
   e. 150% drop in quantity demanded.

2. Joe and Maria work for Purely Pizza. Maria claims they would decrease their total revenue by increasing the price of their pizza while Joe believes they would be better off by increasing the price. We can conclude that
   a. Maria thinks the pizza demand elasticity is zero, and Joe thinks it equals 1.
   b. Maria thinks the demand for pizza is price inelastic and Joe thinks it is price elastic.
   c. Maria thinks the demand for pizza has price elasticity equal to 1 and Joe thinks the price elasticity equals zero.
   d. Maria thinks the demand for pizza is price elastic and Joe thinks it is price inelastic.
   e. they are both wrong.

31. Currently Joe and Helen are consuming the same amount of strawberries, but Joe's demand curve is less elastic than Helen's. Which statement is true?
   a. Helen's consumer surplus exceeds Joe's.
   b. Any comparison of consumer surplus depends on the price of strawberries.
   c. Helen's consumer surplus equals Joe's.
   d. No statement can be made regarding consumer surpluses.
   e. Joe's consumer surplus exceeds Helen's.

4. Where the marginal revenue curve corresponding to a downward sloping demand curve is positive, the demand elasticity
   a. **is greater than one in absolute value.**
   b. is exactly unity.
   c. is less than one in absolute value.
   d. is zero.
   e. is infinite.

1. A consumer maximizes his total utility when goods A and B are consumed such that MU_A/MU_B
   a. equals the ratio of total utility of A to that of B.
   b. equals the ratio of the price of B to the price of A.
   c. equals the ratio of the price of A to the price of B.
   d. equals the ratio of the quantities demanded.
   e. always equals unity.

2. A diminishing marginal rate of substitution implies that individuals
   a. get more utility from a good when they have less of it.
   b. **get greater marginal utility when they have less of it.**
   c. get less total utility as a result of consuming more.
   d. get greater marginal utility when they consumer more.
   e. none of the above.

3. By law, a company must:
   a. pay all of its net profits to the shareholders because the shareholders are the legal owners.
   b. retain some profits to protect the future of the company.
   c. ensure that owners make a capital gain on their investment.
   d. all of the above.
   e. none of the above.

4. Limited liability means that:
   a. the chief executive cannot be sentenced to prison in case of malpractice.
   b. the firm's proprietor has undefined risk.
   c. the shareholders of the company have limited exposure to debt repayment.
   d. the shareholders have no personal responsibility for debt incurred by the company.
   e. holders of corporate debt get last claim on a company's income.

5. The principal-agent problem refers to a situation where:
   a. the owner has the wrong objectives for her company.
   b. the owner and the manager disagree over policy.
   c. the manager may not maximize profits of the company, but may foster his own interests.
   d. the manager maximizes market share.
   e. the manager always follows the directives from a corporation's directors.

6. For the following gamble, with a probability of 20% that one wins $100 and an 80% probability of losing $25, Regis takes the gamble and Bryan rejects it. One can infer that:
   a. both Regis and Bryan are risk averse.
   b. neither Regis nor Bryan are risk averse.
   c. Regis is risk averse and Bryan is risk neutral.
   d. Bryan is risk averse and Regis is risk neutral.
   e. both are risk neutral.

7. Suppose that you are a risk averter and you have the opportunity to play a game and either win or lose $500. We can conclude that you:
   a. will be unable to decide whether to play the game or not.
   b. will play the game because the chance to win $500 brings more pleasure than the potential pain received by losing $500.

c. will play the game because the pain resulting from a $500 loss is less than the pleasure resulting from the $500 win.
d. **will not play the game because the potential loss of $500 generates more pain than the potential pleasure of winning $500.**
e. will play any game where there is an equal chance of winning and losing the same amount.

8. Joe is a tax accountant. He receives $80 per hour doing tax returns. He can type 16 pages per hour. He can hire an assistant who types 10 pages per hour. Which of the following statements is true?
a. Joe should not hire an assistant because the assistant cannot type as fast as he.
b. Joe should hire the assistant as long as he pays the assistant less than $100 per hour.
c. Joe should hire the assistant as long as he pays the assistant less than $80 per hour.
d. Joe should hire the assistant as long as he pays the assistant less than $50 per hour.
e. Joe should hire the assistant as long as he pays the assistant less than $40 per hour.

9. When asked in an interview what she missed the most because of the time she spent training for the Olympics, a rower revealed that she had given up a job that paid $35,000 per year to train full-time. She received a grant of $7,000 per year from Sports Canada, but this could not cover all her training expenses. Her food and rent were $10,000 per year and training expenses were $12,000 per year. What is the annual opportunity cost, expressed in dollars, to this rower of "Going for Gold"?
a. $28,000.
b. $35,000.
c. **$40,000.**
d. $52,000.
e. $54,000.

10. At its current level of output, a perfectly competitive firm's, average variable cost is $10, average total cost is $12, and marginal cost is $14. If the market price is $16, this firm can increase profits by
a. shutting down production.
b. decreasing output.
c. increasing output.
d. increasing the market price.
e. not changing output because this firm is at its profit-maximizing position.

11. In the short run, a monopolist has a MC curve that is constant at $10 per unit. At his present output the MR is $16. To maximize profit he should:
a. shut down.
b. expand output and raise price.
c. expand output and cut price.
d. cut output and raise price.
e. cut output and price.

Table X: Costs of producing wine and windmills for electricity generation

	France (euros)	Germany (euros)
Wine	10	20
Generator	10,000	30,000

Referring to the above table X, we can say:

a. France has a comparative advantage in both goods.
b. France has a comparative advantage in wine and Germany has a comparative advantage in generators.
c. Germany has a comparative advantage in wine and France has a comparative advantage in generators.
d. Germany has a comparative advantage in both goods.
e. these countries gain no benefit from trading.

12. Excess capacity in monopolistically competitive firms is caused by
a. the fact that rival firms enter the industry and reduce the demand for the products of the firms already in the industry.
b. the fact that each firm attempts to maximize profits.
c. cost curves being higher than they are under perfect competition.
d. the waste associated with many differentiated products serving almost the same purpose.
e. the fact that each firm faces a demand that is not perfectly elastic.

13. Once a cartel determines the profit-maximizing price,
a. each member will face the temptation to cheat on the cartel price in order to increase its sales and profits.
b. changes in the output of any member firms will have no impact on the market price.
c. entry into the industry of rival firms will raise profits as long as they join the cartel.
d. entry into the industry of rival firms will have no impact on the profit of the cartel.
e. all members of the cartel have a strong incentive to abide by the agreed-upon price.

14. Which of the following is not a requirement of a game?
a. Players.
b. Payoffs.
c. Dominant strategies.
d. Knowledge of the payoffs.
e. Optimizing participants.

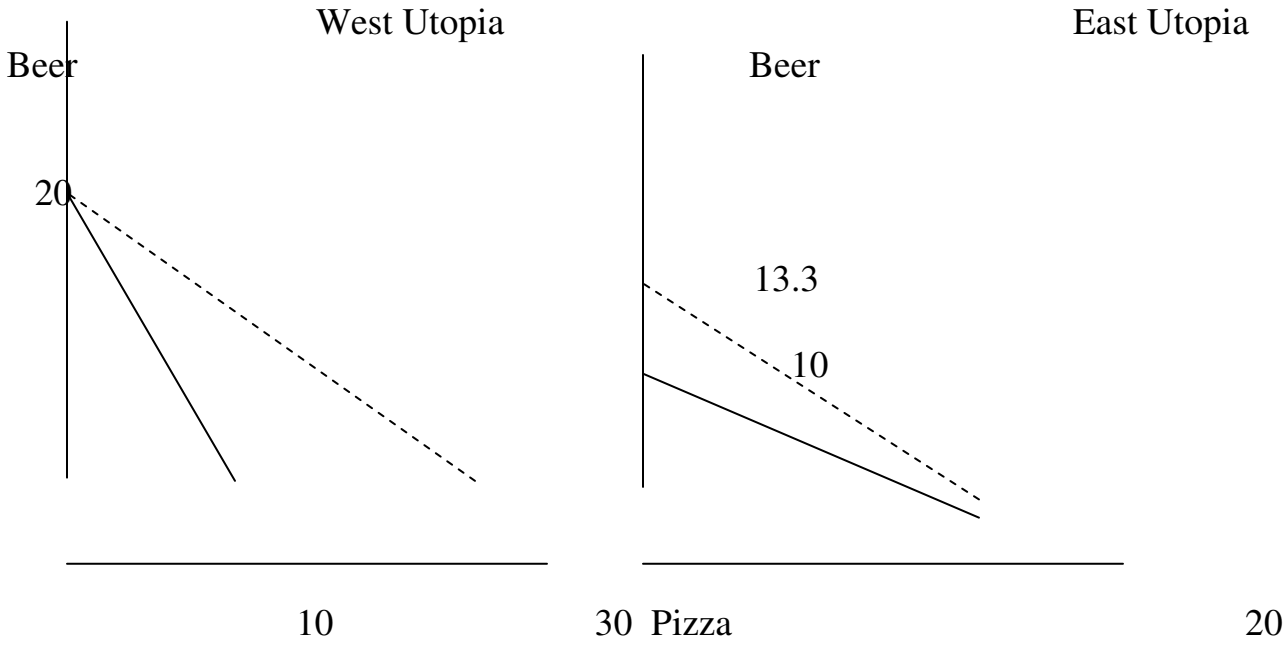
15. A Nash equilibrium is one where
a. the game has only one winner.
b. each player could do better by adopting a different strategy.
c. each player is doing her best, given the strategy of the other player.
d. the outcome is always a prisoners' result.

e. the participants make the maximum possible total profit for two firms combined.

16. An implicit or explicit agreement between two firms in an industry not to compete with each other is known as:
a. the duopoly model.
b. collusion.
c. non-cooperative oligopoly.
d. product differentiation.
e. prisoners' dilemma.

17. In Canada, competition policies are governed by _____, and it _____
a. the Competition Bureau, prohibits the formation of monopolies.
b. the Competition Bureau, does not prohibit the formation of monopolies.
c. the Department of Finance, prohibits the formation of monopolies.
d. the Department of Finance, does not prohibit the formation of monopolies.
e. Canada Revenue Agency, prohibits the formation of monopolies.

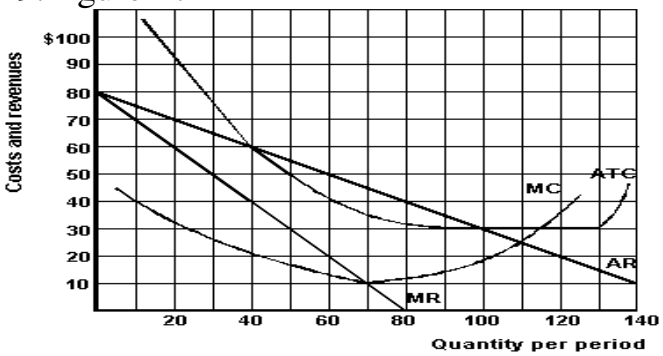
18.Figure Y:



Referring to the above figure Y: The solid lines are production possibilities curves; the dashed lines are trading possibilities curves. The opportunity cost of producing a:

a. pizza is 2 beers in both countries.
b. beer is 1/2 a pizza in both countries.
c. pizza in East Utopia is 1 beer.
d. beer in West Utopia is 1/2 a pizza.
e. beer in West Utopia 2 pizzas.

19.Figure Z:



Referring to figure Z above: If the monopolist wishes to maximize its **total revenue**, what will be its price and output?

a. $0 and 80.
b. $10 and 70.
c. $10 and 140.
d. $40 and 80.
e. $45 and 70.

20.Table W:

Price of beer ($/unit)	Total Quantities		
	Group A	Group B	Group C
5	18	41	60
4.50	26	48	65
4	34	55	70
3.50	42	62	75
3	50	69	80
2.50	58	76	85

Referring to the above table W: If the beer producers could price discriminate on the basis of consumer type, in order to maximize total revenue, what price should be charged to each group?

a. $3, $3 and $4.
b. $3, $4 and $4.
c. $3, $4 and $5.
d. $3.50, $4 and $4.50.
e. $4, $4, $5.

Part II: Answer FOUR of the following five questions. If more than four questions are answered, only the first four will be marked (Total=80 marks).

Question 1 (20 marks)

The market for chess sets in Dumbledorf is given by the following demand and supply equations:

Demand → P = 110 – 3Q

Supply → P = 10 + 2Q

(i) Calculate the equilibrium market price and quantity (2 marks).
Ans: P=$50, Q=$20.

(ii) Suppose now that the government decides to subsidize chess sets by giving suppliers a $10 subsidy for every set they produce. Calculate the new market equilibrium and illustrate graphically (6 marks).
Ans: P=$44, Q=22.

(iii) Compute the consumer and producer surpluses in the new market equilibrium (4 marks).
Ans: PS=$484, CS=$726.

(iv) With no subsidy, but instead a price ceiling of P = $46, compute the producer and consumer surpluses and illustrate graphically (8 marks).
Ans: PS=$324, CS=$666.

Question #2 (20 marks)

Suppose the prices of two goods are Px = $12 and Py = $5, and we observe the consumer to purchase exactly five units of each good.

(i) Graph the resulting budget constraint on a diagram (with good Y on the vertical axis and good X on the horizontal axis), with intercepts clearly marked, explaining how you arrive at the answers. What is the consumer's total income? (4 marks)
Ans: Income = $5*12 + $5*5 = $85. Intercepts are y = 85/5 = 17; x = 85/12 or 7.0833.

(ii) What is the numerical value of the MRS at this equilibrium? (4 marks)
Ans: Px/Py = 12/5 = 2.4.

(iii) Now suppose the government puts a tax on good X of $2 per unit. What is the numerical value of the MRS at the new equilibrium? Explain (6 marks).
Ans: 14/5 = 2.8.

(iv) Instead of the tax on X, suppose that the government reduces the consumer's income by $10. If good X is inferior, carefully illustrate on a diagram a possible new equilibrium where the first equilibrium is also illustrated (6 marks).
Ans: An equilibrium below and to the right on a lower indifference curve.

Question #3 (20 marks)
Suppose that both Tom and Sara like to grow tomatoes and green peppers in their backyards. In a 30-day month, Tom can grow in his backyard either 80 tomatoes and 0 peppers or 0 tomatoes and 40 peppers or any other combination lying on the line between these two points. In the same amount of time, Sara can grow in her backyard either 40 tomatoes and 0 peppers or 0 tomatoes and 8 peppers or any other combination lying on the line between these two points.

(i) No trade: Assume that Tom and Sara both spend half of their time to produce tomatoes and the other half of their time to produce peppers. How many tomatoes and peppers can each consume? Draw two separate graphs for their PPFs, with tomatoes (T) on the vertical axis and peppers (P) on the horizontal axis (4 marks).
Ans: Tom consumes (40T, 20P), while Sara consumes (20T, 4P).

Graphs in previous versions were incorrect.

(ii) If they start trading with each other, what should Tom sell and what should Sara sell? Explain by calculating the opportunity costs of producing peppers and tomatoes for Tom

and Sara, respectively (4 marks).

Ans: Tom should sell peppers, while Sara should sell tomatoes. This is because Tom has a lower OC than Sara in producing peppers (Tom → 1P=2T; Sara → 1P=5T), while Sara has a lower OC in producing tomatoes (Tom → 1T=0.5P; Sara → 1T=0.2P).

(iii) Following from (ii): Suppose Tom and Sara each specializes in producing only the good in which she/he has a lower opportunity cost. Also suppose Tom and Sara exchange 5 peppers for 15 tomatoes with each other (you have to determine who sells peppers and who sells tomatoes). Calculate the new consumption bundles of Tom and Sara and plot them on your graphs in (i) (6 marks).

Ans: Tom consumes (15T, 35P), while Sara consumes (25T, 5P).

(iv) Following from (iii): Show that given Tom's and Sara's consumption quantities of tomatoes, they could not have produced/consumed the corresponding quantities of peppers you have found in (iii) in the absence of trade (6 marks).

Ans: Tom gains because if he were to produce 15T himself (5.625 days out of 30), his remaining time (24.375 days) can only be used to produce 32.5P. Now he enjoys 35P.

As for Sara, if she were to produce 25T (takes her 18.75 days), her remaining time (11.25 days) can only be used to produce 3 P. Now she has 5P, therefore she also gains.

Question #4 (20 marks)

Suppose the market for internet "dot-com" companies is characterized by perfect competition. The total cost function TC for every single firm is given by $TC = Q_s^2 + 10Q_s + 100$, where Q_s is an individual firm's quantity supplied. Think of this as the short run cost corresponding to the minimum of the long run average cost curve.

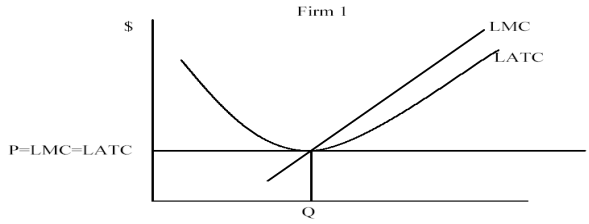
The marginal cost MC corresponding to this TC is given by $MC = 2Q_s + 10$.

Total demand from all consumers is the market demand $P = 1000 - QD$.

Note that each firm takes P as given, but all firms collectively determine P. In the industry equilibrium $QD = QS$, where QS is the sum of all individual firms' Q_s.

(i) Individual firm: Let P be unknown for now. Illustrate the long run equilibrium for a representative firm by drawing the MC, the ATC and the equilibrium price (2 marks).

Ans:



(ii) Individual firm: Let P be unknown for now. Solve for the individual firm's Q_s (2 marks).
Ans: Set MC=ATC, where ATC=TC/Q, this will yield Q=10.

(iii) Individual firm: Let P be unknown for now. Find the individual firm's MC at the equilibrium output (2 marks).
Ans: Plug Q=10, MC=$30.

(iv) Individual firm: Find the individual firm's ATC at this output (2 marks).
Ans: ATC=MC=$30.

(v) Individual firm: Find the identical P that each firm will charge (2 marks).
Ans: P=MC=ATC=$30.

(vi) Industry: Given your P in (v), find the industry equilibrium QS=QD (2 marks).
Ans: P=1000-QD, so $30=1000-QD, so QD=QS=970.

(vii) Given all of your answers above, how many firms are there in the industry? (2 marks)
Ans: Since we know each firm supplies Q=10, and total QS=970, so there are 97 firms.

(viii) What is the value of industry profits? (2 marks)
Ans: Since P=ATC, profits=$0.

(ix) Now, suppose that the popularity of "dot-com" company products falls. In the short run, will the firms in the market earn profits, earn losses, or break even? Describe what will happen, no need for calculations. For simplicity, assume that the cost curves will not change (2 marks).
Ans: Demand shifts inward, and in the short run, fixed costs cannot be avoided. Therefore, the existing

firms will earn negative profits.

(x) In the long run, will the number of firms in the market increase or decrease? Explain (2 marks).

Ans: Some firms in (x) will exit, hence there will be fewer than 97 firms in the market.

Question 5 (20 marks)
A large share of the world supply of diamonds comes from Russia and South Africa. Suppose that the marginal cost of mining diamonds is constant at MC = $2000 per diamond. For simplicity, marginal cost = average total cost. The demand for diamonds is described by the following schedule:

Price	Quantity	**TR**	**MR (per diamond)**
$9 000	4 000	**36,000,000**	------
8 000	5 000	**40,000,000**	**4,000**
7 000	6 000	**42,000,000**	**2,000**
6 000	7 000	**42,000,000**	**0**
5 000	8 000	**40,000,000**	**-2,000**
4 000	9 000	**36,000,000**	**-4,000**
3 000	10 000	**30,000,000**	**-6,000**
2 000	11 000	**22,000,000**	**-8,000**
1 000	12 000	**12,000,000**	**-10,000**

(i) If there were many, many suppliers of diamonds, what would be the price, quantity and profits (3 marks)?
Ans: P = MC, so quantity supplied=11,000, P=$2,000 and π=0.

(ii) Fill in the table above for TR and MR (per diamond) (4 marks).
Ans: See above.

(iii) If there were only one supplier of diamonds, what would be the price, quantity and profits (3 marks)?
Ans: MR=MC, and MR=$2,000 at Q=6,000, P=$7,000 and π=($7,000-$2,000)*6,000=$30,000,000.

(iv) If Russia and South Africa formed a cartel, what would be the price and quantity? If the countries split the market evenly, what would be South Africa's production and profit? What would happen to South Africa's profit if it increased its production by 1,000 while Russia stuck to the cartel agreement? (8 marks)
Ans: They would jointly behave as a monopolist and charge P=$7,000, Q=6,000 and π=$30,000,000. If they split the profits evenly, then each produces Q=3,000 and earns $15,000,000. However, if South Africa produces Qs=4,000 and Russia sticks

to Qr=3,000, then the total quantity supplied is 7,000. At this Q, the price is $6,000. South Africa will earn π=($6,000-$2,000)*4,000=$16,000,000, while Russia will earn π=($6,000-$2,000)*3,000=$12,000,000.

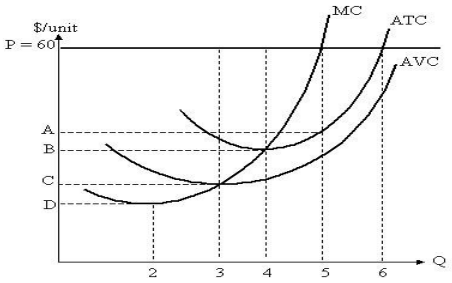
(v) Use your answer to part (iv) to explain one reason why cartel agreements are often not successful? (2 marks)

Ans: Because any previous tacit agreement to cut back production to keep prices high will not be honoured. Each firm has the incentive to cheat on the other, i.e., "agree" to cut back production and then subsequently raise output. The cheater earns more profits, and the cheated loses. The "cheated" knows this, it will cheat simultaneously.

ECON 201 – INTRODUCTION TO MICROECONOMICS Winter 2010

Part I: Multiple Choice Questions. Write your answers on the computer sheet in PENCIL (Total=25 marks).

1. If the price faced by a perfectly competitive firm is equal to $60, then the maximum profit this firm will earn is...



a. $(60 - D)x2
b. $(60 - C)x3
c. $(60 - B)x4
d. $(60 - B)x5
e. $(60 - A)x5

2. Consider a perfectly competitive firm in the following position: the firm produces 4000 units, the market price is $1, fixed costs are equal to $5000, variable costs equal $900, and marginal cost equals $1.10. In order to maximize profit in the short-run the firm should

a. reduce output
b. increase output
c. shut down
d. increase the market price
e. not change output

3. Suppose the per-unit tax on cars is raised. If the demand for cars is unit elastic and the supply curve is upward sloping then this will cause tax revenue to ___. [Hint : Tax revenue = Spending by consumers minus firm revenue. Use elasticity to figure out what happens to consumer spending. Use diagram to figure out what happens to firm revenue].

a. rise
b. fall
c. stay constant
d. rise if the supply elasticity is greater than one and fall if the supply elasticity is less than one
e. rise if the supply elasticity is less than one and fall if the supply elasticity is greater than one

4. Data on the prices, quantities sold, and average incomes of buyers of Jolt Cola and Coke, over several years, are shown below.

Year	Price of Jolt	Price of Coke	Average Income of Buyers	Quantity of Jolt Sold
2000	$1.00 / can	$1.00 / can	$25,000	15,000 cases
2001	$1.00 / can	$1.40 / can	$25,000	25,000 cases
2002	$1.00 / can	$1.40 / can	$35,000	15,000 cases
2003	$1.40 / can	$1.40 / can	$35,000	5,000 cases

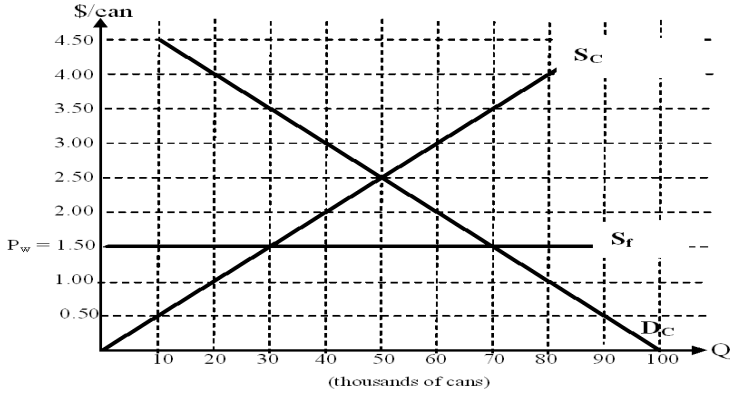
The income elasticity of Jolt is:

a. 1.5
b. 0.67
c. -0.67
d. -1.5
e. not determinable, given that all the variables are changing.

5. The demand equation for widgets is $P = 200 - 5Q_D$. The absolute value of the price elasticity of demand between quantity demanded of 23 and 27 is

a. 0
b. 0.16
c. 0.2
d. 0.6
e. 1.0

6. The market for canned tuna is shown below. The foreign supply curve S_f is drawn as perfectly elastic at the world price of $1.50 per can. The Canadian domestic demand and supply curves are denoted as D_C and S_C respectively



A tariff of $0.50 per can is imposed on imported cans of tuna. Government tariff revenue from this tariff is _____, and the deadweight loss caused by the tariff is _____.

a. $10,000, $5,000

b. $20,000, $2,500
c. $25,000, $5,000
d. $15,000, $2,500

7. Which of the following leads to the buyers paying all of a tax?
a. Demand is perfectly price elastic
b. Demand is perfectly price inelastic.
c. Price elasticity of demand equals 1
d. Price elasticity of supply equals 1
e. Supply is perfectly price inelastic.

8. An effective minimum wage imposed on a competitive labour market will
a. raise the incomes of all workers and raise employment
b. raise the incomes of all workers and not change employment
c. have no effect on worker income or employment
d. raise the incomes of workers who keep their jobs and lower employment.
e. lower the income of all workers and raise employment.

9. Using a supply and demand diagram of your own, if a per unit tax is imposed, the more elastic the supply curve, the:
a. more likely the deadweight loss is to be affected.
b. larger the deadweight loss.
c. larger the deadweight loss to producers.
d. smaller the deadweight loss to consumers.

10. Dave is risk-averse while Scott is risk-neutral. Both are confronted with the following gamble: win $5,000 with the probability of 65% or lose $9,000 with a probability of 35%. One can predict that:
a. both will accept the gamble.
b. only Scott will accept the gamble.
c. only Dave will accept the gamble.
d. Scott will accept and Dave may accept.

11. The process of buying a variety of assets is called:
a. risk aversion.
b. risk seeking.
c. profit maximization.
d. diversification.

12. The Figure below shows the apartment rental market in Bigtown. If the Bigtown Housing Authority imposes a rent ceiling *above* $750 per month, the ceiling will

a. Help all tenants (i.e. renters)
b. Help all landlords
c. Have no effect
d. Help some tenants (i.e. ones that can find apartments) and hurt other tenants (i.e. ones who can no longer find apartments)
e. Help some landlords (i.e. ones that can find tenants) and hurt other landlords (i.e. ones that can no longer find tenants)

13. When economists describe a good as being 'under-priced', they mean that:
   a. output should be increased because the marginal social benefit in consumption exceeds the marginal social cost of production.
   b. too much of the good is being produced since there is a negative externality associated with the good.
   c. resources are properly allocated since society wants more of the good at a lower price.
   d. there is an under-allocation of resources in the production of the good.
   e.

14. A movement along any given demand curve for a particular good reflects a changing quantity demanded of the good and a change in:
   a. the number of buyers in the market for the good.
   b. the income level of consumers.
   c. the prices of related goods.
   d. the price of the good itself.

15. Assuming that peanut butter and jam are complementary goods, an increase in the price of peanut butter will cause:
   a. a decrease in the demand for peanut butter.
   b. a decrease in the demand for jam.
   c. an increase in the demand for jam.
   d. no change in the demand for jam but a decrease in the quantity demanded of peanut butter.

16. A quota results in:
   a. a reduction in demand.
   b. a redefinition of the supply curve.
   c. a shift in the demand curve.
   d. none of the above.

17. You wait in line to buy a ticket for a show and are fortunate to buy the last ticket for $65. The lady behind you offers to buy the ticket for $100 but you refuse. We can conclude that the value you place on the show is:
   a. less than $65.
   b. $65.
   c. $100.
   d. at least $100.

18. Suppose that a firm's total cost of producing an output of 400 units a day is currently $2,000. If technology and the price of inputs remain unchanged, what level of output would be produced if total costs incurred are $4,000 and increasing returns to scale exist?
   a. More than 400 but less than 800 units.
   b. 5 units.
   c. 800 units.
   d. More than 800 units.

19. What does MES (minimum efficient scale) refer to?
   a. The marginal efficient size of a firm.
   b. The biggest-size plant that is capable of achieving economies of scale.
   c. The biggest-size plant that is capable of achieving diseconomies of scale.
   d. The smallest-size plant capable of achieving the lowest long-run average cost of production.

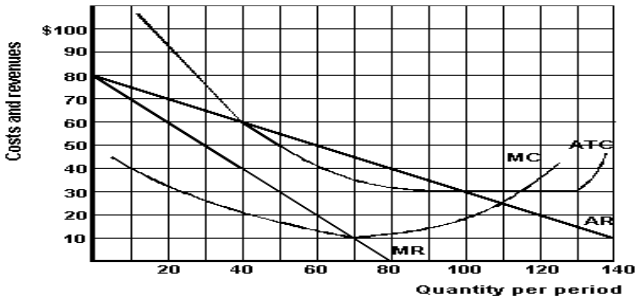
20. When the pure monopolist and the pure competitor are compared, the monopolist does not use society's scarce resources as efficiently since:
   a. the monopolist charges a price for its output that is too high.
   b. the monopolist does not equate MC and MR when determining its optimal output level.
   c. the monopolist is able to practice price discrimination, and this harms society.
   d. the monopolist does not produce enough of the good.

21. If firms are allowed to fully cooperate, then they establish a market price and quantity by equating:
   a. the industry demand and industry average total cost.
   b. industry marginal revenue and industry average total cost.
   c. industry marginal cost and industry average variable cost.
   d. industry marginal revenue and industry marginal cost.

22. In monopolistic competition the long-run tangency equilibrium is between:
   a. demand and average cost.
   b. marginal cost and marginal revenue.
   c. price and average cost.
   d. marginal cost and average cost.

23. Which one of the following would suggest the existence of a barrier to entry into a market?
   a. Monopoly profits.
   b. Economies of scale.
   c. Patents on products.
   d. All of the above.

Use the following diagram to answer the next question:



24. Where demand is the average revenue curve AR, if the monopolist is regulated and forced to charge the socially optimum price and produce the *efficient* level of output, what will be its price and output?
a. $10 and 70.
b. $25 and 110.
c. $30 and 100.
d. $45 and 70.

25. The law of comparative advantage states that countries _____ in producing and exporting the goods that they produce at a lower _____ cost than other countries.
a. diversify, absolute
b. specialize, relative
c. diversify, relative
d. specialize, absolute

Part II: Answer FOUR of the following five questions. If more than four questions are answered, only the first four will be marked (Total=80 marks).

Question 1. International trade and comparative advantage (20 marks)
The following are hypothetical production possibilities tables for Canada and the United States.

Canada's Production Possibilities Table
(Millions of bushels)

	A	B	C	D
Peaches	0	5	10	15
Apples	30	20	10	0

The United States' Production Possibilities Table
(Millions of bushels)

	A	B	C	D
Peaches	0	10	20	30
Apples	15	10	5	0

For each line required, plot any two or more points on the line.
(i) Plot Canada's production possibilities curve by plotting at least 2 points on the curve. (2 marks)
Canada's Production Possibilities Curve
An example of two points you could have plotted to define this line are (0,15) and (30,0)

(ii) Plot the United States' production possibilities curve by plotting at least 2 points on the curve on the graph above. (2 marks)
The United States' Production Possibilities Curve
An example of two points you could have plotted to define this line are (0,30) and (15,0)
(iii) What is each country's cost ratio of producing Peaches and Apples? (4 marks)
Canada

The correct ratio is : 2 apples = 1 peach.
In Canada, 2 apples must be given up to get 1 peach. This means that in Canada the domestic cost ratio for the two goods is 2 apples for 1 peach.

The United States
The correct ratio is : 1 apple = 2 peaches.
In the United States, 1 apple must be given up to get 2 peaches. This means that in the U.S. the domestic cost ratio for the two goods is 1 apple for 2 peaches.

(iv) Which nation should specialize in which product? (3 marks)
The United States should specialize in peaches because the U.S. has the lowest domestic opportunity cost of peaches. Canada should specialize in apples.

(v) Plot the United States' trading possibilities curve (by plotting at least 2 points on the curve) if the actual terms of the trade are 1 apple for 1 peach. (3 marks)
US's Trading Possibilities Curve
An example of two points you could have plotted to define this line are (30,0) and (0,30)

(vi) Plot the Canada' trading possibilities curve (by plotting at least 2 points on the curve) if the actual terms of the trade are 1 apple for 1 peach. (3 marks)
Canada's Trading Possibilities Curve
An example of two points you could have plotted to define this line are (30,0) and (0,30).

(vii) Suppose that the optimum product mixes before specialization and trade were B in the United States and C in Canada. What are the gains from specialization and trade? (3 marks)
The correct answer is : 10 peaches and 10 apples.
Before specialization, the United States produced 10 peaches and 10 apples, and Canada produced 10 peaches and 10 apples for a total of 20 peaches and 20 apples.
After specialization, the United States will specialize in peaches, producing 30 peaches and Canada will specialize in apples, producing 30 apples, for a total of 30 peaches and 30 apples.
The gain in production is the difference between the pre-specialization production and the after-specialization production, which is 10 peaches and 10 apples.

Question 2. Consumer and Producer Surpluses, and Government Intervention (20 marks)

The demand function for amalgamated widgets is

$$Q = 100 - 2P,$$

and the supply function is

$$Q = 2P.$$

(i) Find the equilibrium price and quantity; graph your solution, labeling the intercepts. (4 marks)

P = 25 and Q = 50

(ii) Find consumer surplus, producer surplus and the total social welfare. (4 points)

CS =(50-25)*50/2=625

PS =25*50/2=625

TW = 1250

Suppose the government now decides to provide a subsidy of $5 per unit to the suppliers of widgets.

(iii) Find the new equilibrium quantity, the price paid by consumers, the payment per unit received by producers (including the subsidy and what consumers pay). (4 marks)

Q = 55

Price paid by consumers = 22.5

Payment per unit received by producers = 27.5

(iv) Given such a subsidy policy, find the new consumer surplus, producer surplus, the cost to the government and the deadweight loss. (4 marks)

CS = (50-22.5)*55/2=756.25

PS = 27.5*55/2=756.25

Costs to the government = 275

DWL = change in consumer surplus + change in produce surplus + change in government funds= 131.25+131.25-275=12.5

(v) How would your answers to (iv) change if the subsidy is now not giving to suppliers but buyers? (4 marks)

No change at all. This is seen through a diagram where demand shifts to the right by $5 - in a parallel fashion. The new intersection point will be at the equilibrium price

of $27.5. This results in consumers actually paying (27.5-5)=$22.5 and producers receiving $27.5, the fact that yields the same CS and PS computed in part (iv).

Question 3: Budget Constraint (20 marks)

I have cappuccino and muffins every morning at the Starbuck's on Guy.

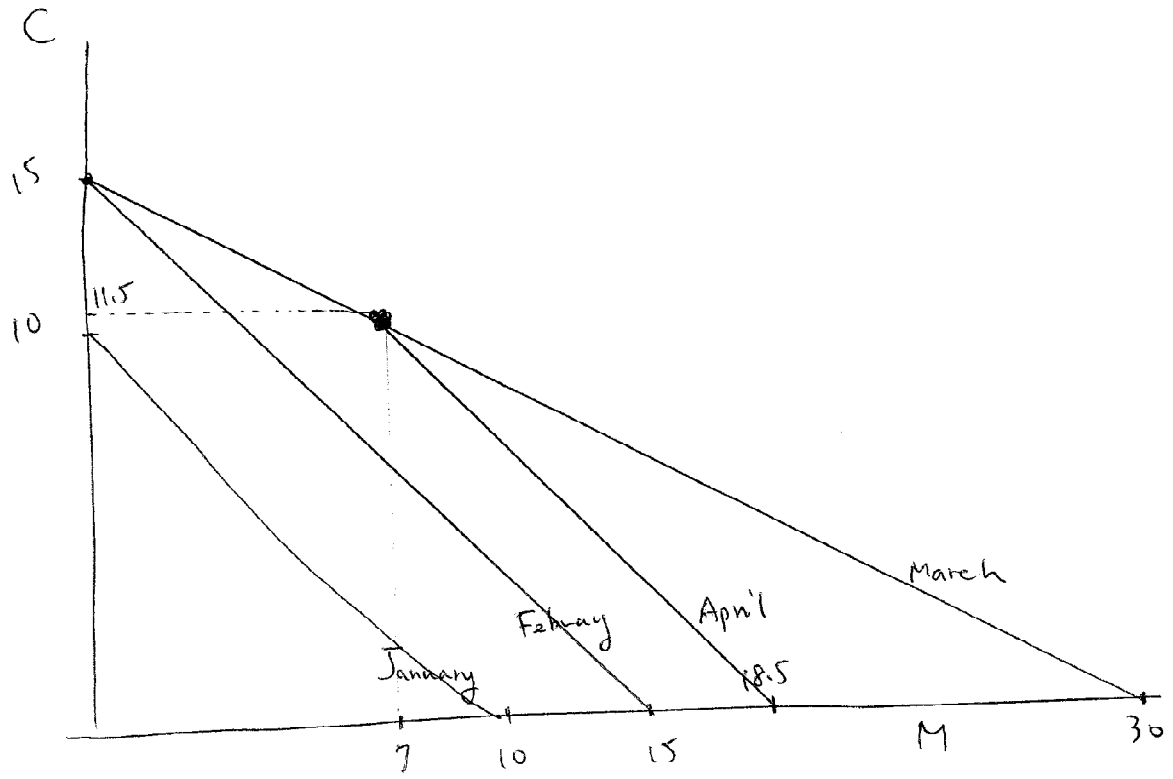
(i) In January, I decided I could afford to spend $20/week on cappuccino and muffins; cappuccino was $2 and muffins were $2. (5 marks)

(ii) In February, I decided I could afford to spend $30/week; prices remained the same. (5 marks)

(iii) In March, I discovered that the Java U across the street from Starbuck's sells equally good muffins for $1. So, I started buying cappuccino at Starbuck's and muffins at Java U's. [Everything else remained the same as in February.] (5 marks)

(iv) In April, Starbuck's manager got a little huffy (annoyed) about my bringing in muffins from Java U's across the street (and sitting in Starbuck's to drink and eat and read the paper). After much argument, we came to a compromise: I can bring in 7 muffins per week from Java U's – but after that I have to buy all my muffins at Starbuck's. [Everything else remained the same as in February.] (5 marks)

On **ONE DIAGRAM**, show my budget set in January, February, March, and April.



Question 4: Perfect Competition (20 marks)

Gasoline is sold through local gas stations under perfectly competitive conditions. All gas station owners face the same long-run average cost curve given by

$$LRAC = 0.1q - 1 + \frac{1000}{q}$$

and the same long-run marginal cost curve given by

$$MC = 0.2q - 1$$

where q is the number of gallons sold per day.

(i) Assuming the market is in the long-run equilibrium, how much gas will each individual owner sell per day? What are the long-run average cost and marginal cost at this output level? (7 marks)

LRAC=MC

➔ q = 100, LRAC = MC = 19

(ii) The market demand for gasoline is given by

$$Q = 2{,}500{,}000 - 500P$$

where Q is the number of gallons demanded per day and P is the price per gallon. Given your answer to part a, what will be the price of gasoline in the long-run equilibrium? How much gasoline will be demanded and how many gas stations will there be? (7 marks)

P = LRAC=MC=19, Q =2,500,000-500*19= 2490500, N =Q/q=2,490,500/100=24905

(iii) Suppose that because of the development of hybrid cars, the market demand for gasoline shifts inward to

$$Q = 2{,}000{,}000 - 1{,}000P$$

In long-run equilibrium, what will be the price of gasoline, how much total gasoline will be demanded, and how many gas stations will there be? (6 marks)

LRAC is unchanged=19

→ P=LRAC=MC=19, Q = 2,000,000-1,000*19=1981000, N=Q/q =1,981,000/100= 19810

Question 5. Price Discrimination (20 marks)

Suppose McGraw-Hill (a textbook monopoly on its own textbooks) can produce any level of output it wishes at a constant marginal (and average) cost of $5 per book. Assume that the monopoly sells its books in Canada and Thailand. The inverse demand in Canada can be written as

$$P_C = 55 - Q_C .$$

MR associated with this demand function is:

$$MR_C = 55 - 2Q_C$$

The demand in Thailand is given by

$$P_T = 35 - \frac{Q_T}{2}$$

MR associated with the Thai demand function is:

$$MR_T = 35 - Q_T$$

(i) Suppose McGraw-Hill can maintain the separation between the two markets. (For example, post offices in both countries charge around $100 to ship one book by airmail in addition to taxation.) What level of output should be produced in each market and what price will prevail in each market? What are McGraw-Hill's total profits in this situation? (7 marks)

The existence of shipping costs means that markets can be segregated → company can apply price discrimination:

Canada: Q = 25, P = 30, and Profits = TR-TC=P*Q-MC*Q=30*25-5*25=625

Thailand: Q = 30, P = 20, and Profits = TR-TC= P*Q-MC*Q=20*30-5*30=450

Total profits = 1075

(ii) Assume there are no shipping costs between the two countries, so that the markets can no longer be segmented. What would be the quantity demanded if the price is 40? And how about the quantity demanded when the price is 20.? (7 marks)

If P=40, then quantity demanded in Canada is 55-40=15. Quantity demanded in Thailand is 2(35-40)<0, so that it is zero. Total quantity demanded at P=40 is 15+0=15.

If P=20, then quantity demanded in Canada is 55-20=35. Quantity demanded in Thailand is 2(35-20)=30. Total quantity demanded at P=20 is 35+30=65.

(iii) How would your answer to (ii) change if it costs buyers $5 instead of "0" per book to air-mail books from Thailand to Canada or from Canada to Thailand? (6 marks)

From part "i" we can deduce that when shipping costs exist, the price charged in Canada is $30 and the price charged in Thailand is $20 → Hence, Canadians can buy their books from Thailand at $20 and ship them into Canada and by doing so incur $5 in shipping. The shipped book would cost them $25 as opposed to $30 when buying locally. To prevent this, McGraw-Hill needs to set the price competitively