Test Form: A

Queen's University
Faculty of Arts and Science
Continuing and Distance Studies
Department of Economics

ECON 111: Introductory Microeconomics
Final Examination

Summer 2018
Instructor: Xiaoran Guo

Instructions

This examination is **THREE HOURS** in length.
There are **THREE SECTIONS** to this examination:
Part A (60%): Answer **ALL** 40 Multiple-Choice Questions (1.5% Each)
Part B (20%): Answer **FOUR of SIX** True/False/Uncertain Questions (5% Each)
Part C (20%): Answer **ONE of TWO** Problem Solving Questions

Mark your selection for Part A on the multiple-choice answer card in PENCIL. If you make changes, be sure to erase completely. Please record your name, student I.D. number and test form on the multiple choice answer card. Hand in the card inside your answer booklet.

Write your answers for Part B and Part C in the booklet provided. Put your student number on the front of all answer booklets.

Proctors are unable to respond to queries about the interpretation of exam questions. Do your best to answer exam questions as written.

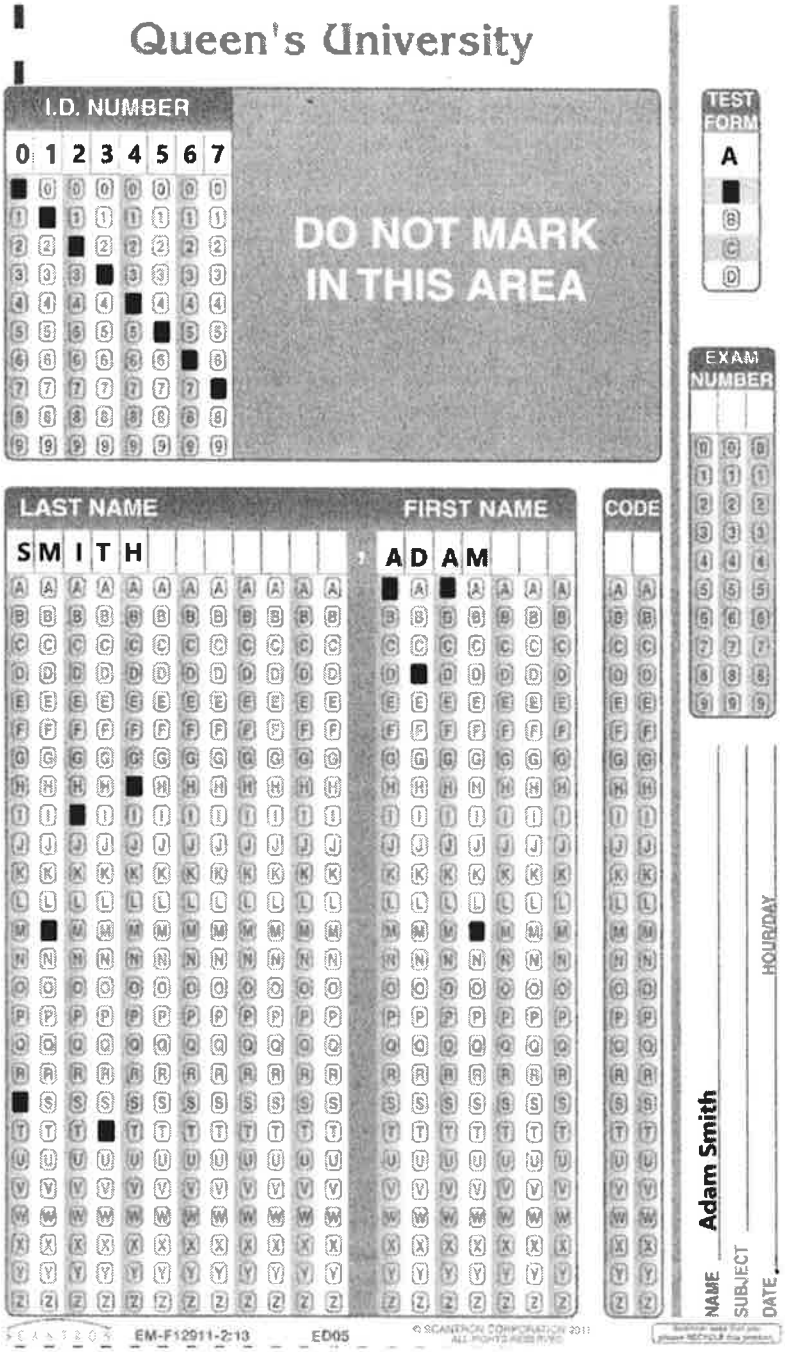
The following aids are allowed: Non-programmable Calculator (Blue Stickers, Gold Stickers, Casio 991).

Name: _____ *Student Number*: _____

IMPORTANT!

SCANTRON SHEET INSTRUCTIONS

1. Write your student number under "I.D. Number" on the Answer Sheet and fill in the appropriate rectangle below each number. (If your number starts with a 0, remember not to omit it.) See example below.
2. Print your last name followed by your first name in the appropriate space and fill in the appropriate rectangle under each letter. (If your name is too long to fit in the spaces provided, please enter as many letters as you can.) See example below.
3. Under "Test Form", fill in "A". See example below.
4. Print your name in "Name". See example below.



Part A: MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Chantal has a full-time job as a geological engineer and earns an annual after-tax salary of $85 000. She decides to leave her job for 6 months to scuba dive on the Great Barrier Reef in Australia, and incurs costs of $7500 for course equipment and certification, $2500 for airfare, and $12 000 for regular living expenses in Australia (equal to her living expenses at home). What is Chantal's opportunity cost for this 6-month, unpaid leave of absence?
A) $52 500 B) $65 000 C) $12 000 D) $22 000 E) $42 000

The diagram below shows two production possibilities boundaries for Country X.

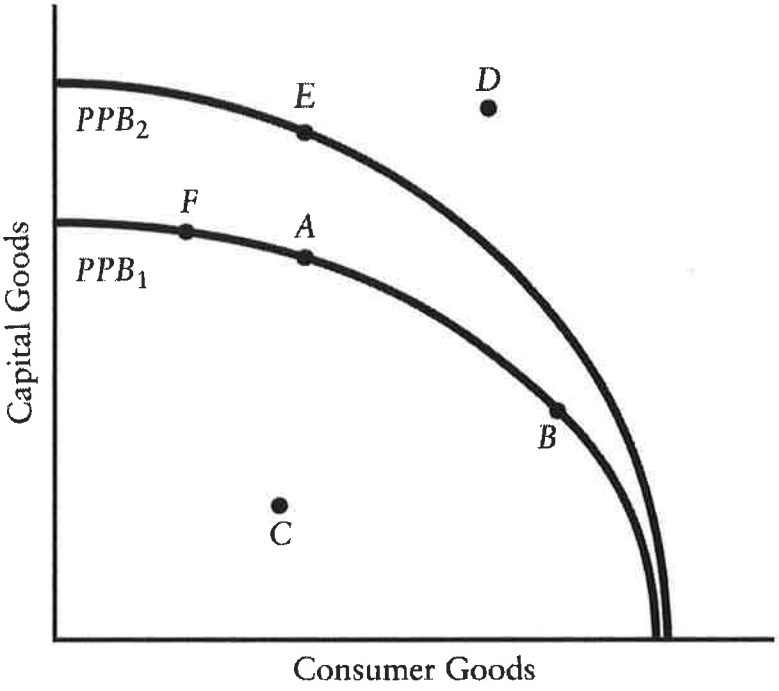


FIGURE 1-4

2) Refer to Figure 1-4. At point B,
A) Country X is producing too many consumer goods and too few capital goods.
B) the price of capital goods is higher than the price of consumer goods.
C) the opportunity cost of producing an extra unit of capital goods is higher than at point A.
D) the opportunity cost of producing an extra unit of consumer goods is higher than at point A.
E) the price of consumer goods is equal to the price of capital goods.

3) The barter system of exchange is inefficient because
A) the double coincidence of wants may not exist.
B) "fair" values cannot be defined without the use of money.
C) exchange partners need to know each other.
D) bargaining power is unequal between rich and poor.
E) markets do not exist.

4) Which of the following statements belongs more properly in the field of normative economics than positive economics?
   A) The price of one Canadian dollar is $0.85 U.S.
   B) Technological change has reduced the cost of cell phone service.
   C) An increase in the minimum wage leads to more unemployment.
   D) Canadian governments should provide assistance to the auto industry.
   E) When a drought occurs, the price of vegetables tends to rise.

5) An economist has data showing household income and energy consumption for 10 000 Canadian households. The best way to illustrate these data is
   A) a scatter diagram.
   B) a logarithmic scale diagram.
   C) a time-series bar chart diagram.
   D) a time-series line graph.
   E) a cross-sectional bar-chart graph.

6) Suppose there is a linear relationship between the ticket price (P) to a university basketball game and the number of tickets sold (Q). If the ticket price is $20, then 600 tickets are sold; if the ticket price is $8, then 3000 tickets are sold. What is the slope of the function if Q is plotted on the horizontal axis and P is plotted on the vertical axis?
   A) 0 B) 0.005 C) -0.005 D) 0.05 E) -0.05

Consider the following information about the production of two goods, X and Y, in two countries, A and B:

- In Country A it takes X_a units of resources to produce one unit of X and Y_a units of resources to produce one unit of Y.
- In Country B it takes X_b units of resources to produce one unit of X and Y_b units of resources to produce one unit of Y.
- Assume the amount of resources used to produce the goods in the two countries can be compared unambiguously.

TABLE 32-1

7) Refer to Table 32-1. Country A has a comparative advantage in producing good X if
   A) (X_a/X_b) is greater than (Y_a/Y_b).
   B) X_a is less than Y_b.
   C) (X_a/Y_a) is less than (X_b/Y_b).
   D) (X_a/Y_a) is greater than (X_b/Y_b).
   E) $X_a = X_b$.

8) Suppose the demand and supply curves in the market for apples have the following functional form: $Q_D = 250 - 4p$ and $Q_S = 10 + p$. If the prevailing market price is 40, then
   A) the market exhibits an excess demand of 50 units.
   B) the market is clearing.
   C) the market exhibits an excess supply of 40 units.
   D) the market exhibits an excess demand of 40 units.
   E) the market exhibits an excess supply of 50 units.

The table below displays hypothetical demand and supply schedules for the market for overnight parcel deliveries in Canada.

	Quantity Demanded (millions)			Quantity Supplied (millions)	
Price ($)	**Year 1**	**Year 2**		**Year 1**	**Year 2**
30	80	95		140	125
26	90	105		135	120
22	100	115		130	115
18	110	125		125	110
14	120	135		120	105
10	130	145		115	100

TABLE 3-4

9) Refer to Table 3-4. Which of the following statements best describes the change in equilibrium price and quantity in this market between Year 1 and Year 2?
   A) There is no change in equilibrium price or quantity from Year 1 to Year 2.
   B) The demand curve has shifted to the left, the supply curve has shifted to the right; as a result equilibrium price is lower and equilibrium quantity is higher.
   C) The demand curve has shifted to the left, the supply curve has shifted to the left; as a result equilibrium price is higher and equilibrium quantity is lower.
   D) The demand curve has shifted to the left, the supply curve has shifted to the right; as a result equilibrium price is higher and equilibrium quantity is lower.
   E) The demand curve has shifted to the right, the supply curve has shifted to the left; as a result equilibrium price is higher and equilibrium quantity is lower.

Consider the following data for a hypothetical economy.

Year	Average Household Income ($)	Price of Gasoline ($/litre)	Quantity Demanded of Gasoline (millions of litres)
2012	78 000	1.30	1940
2013	82 000	1.30	2060

TABLE 4-3

10) Refer to Table 4-3. The income elasticity of demand for gasoline in this economy is
   A) 6.0. B) 0.5. C) 8.3. D) 1.2. E) 0.6.

11) In Canada we have government intervention in the dairy market in the form of quotas on milk production. What are two predicted economic effects of this policy?
A) an equitable distribution of income between dairy farmers and consumers of dairy products; and a reduction in the total amount of economic surplus in the dairy market
B) a redistribution of income from dairy farmers to consumers of dairy products; a reduction in the total amount of economic surplus in the dairy market
C) a redistribution of income from consumers of dairy products to dairy farmers; and a reduction in the total amount of economic surplus in the dairy market
D) a redistribution of income from dairy farmers to consumers of dairy products; and an increase in the total amount of economic surplus in the dairy market
E) a redistribution of income from consumers of dairy products to dairy farmers; and a reduction in deadweight loss in the dairy market

Demand and Supply Schedules for Chocolate Bars

Price ($)	Quantity Demanded (thousands per week)	Quantity Supplied (thousands per week)
2.00	1500	2100
1.80	1600	2050
1.60	1700	2000
1.40	1800	1950
1.20	1900	1900
1.00	2000	1850
0.80	2100	1800
0.60	2200	1750
0.40	2300	1700

TABLE 5-1

12) Refer to Table 5-1. Suppose the government *imposed* a price of $1.80 per chocolate bar. A likely result from this policy is
A) the stockpiling of unsold inventories of chocolate bars.
B) the allocation of chocolate bars on a first-come, first-serve basis.
C) the rationing of chocolate bars.
D) the development of a black market in chocolate bars.
E) the allocation of chocolate bars by sellers preference.

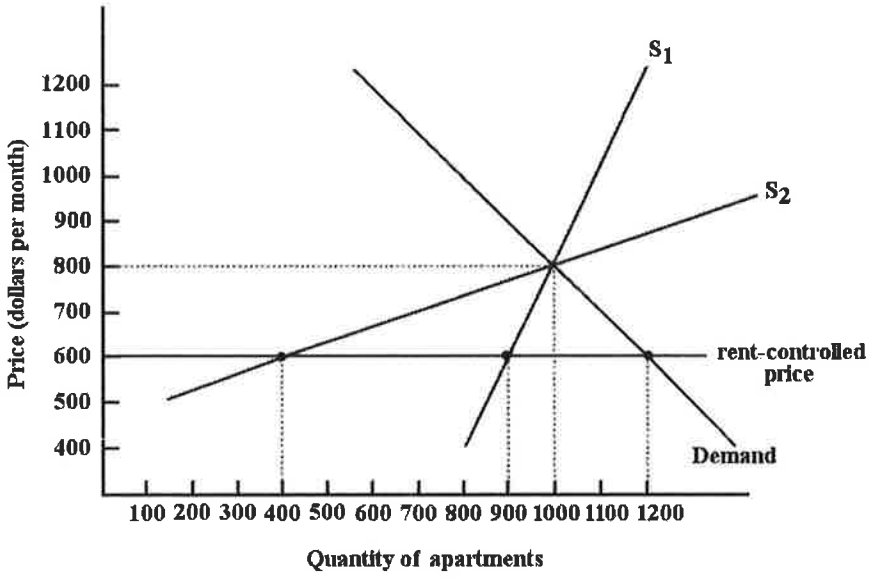


FIGURE 5-4

13) Refer to Figure 5-4. What is the significance of the difference in the slopes of the short-run supply curve (S_1) and the long-run supply curve (S_2) for apartments?

A) Over time, the supply of apartments shrinks in response to the controlled prices - the elasticity of supply increases.

B) Over time, the supply of apartments shrinks in response to the controlled prices - the elasticity of supply decreases.

C) Over time, the demand for apartments shrinks in response to the controlled prices - the elasticity of supply increases.

D) Over time, the demand for apartments increases in response to the controlled prices - the elasticity of supply increases.

E) Over time, the supply of apartments increases in response to the controlled prices - the elasticity of demand increases.

14) Suppose a negatively sloped demand curve and a positively sloped supply curve intersect at a price and quantity combination of $100 and 600 units of the good. But suppose that producers actually produce and sell 610 units. What can we correctly say about market efficiency in this case?

A) This market is not efficient because quantity demanded for the good exceeds quantity supplied.

B) The value placed on the final 10 units of the good by consumers is less than the additional costs associated with their production — this market is not efficient.

C) The value placed on the final 10 units of the good by consumers exceeds the additional costs associated with their production — this market is not efficient.

D) This market is efficient because economic surplus is maximized as production and consumption increase simultaneously.

E) The production and consumption of the additional 10 units of the good increases total economic surplus and increases market efficiency.

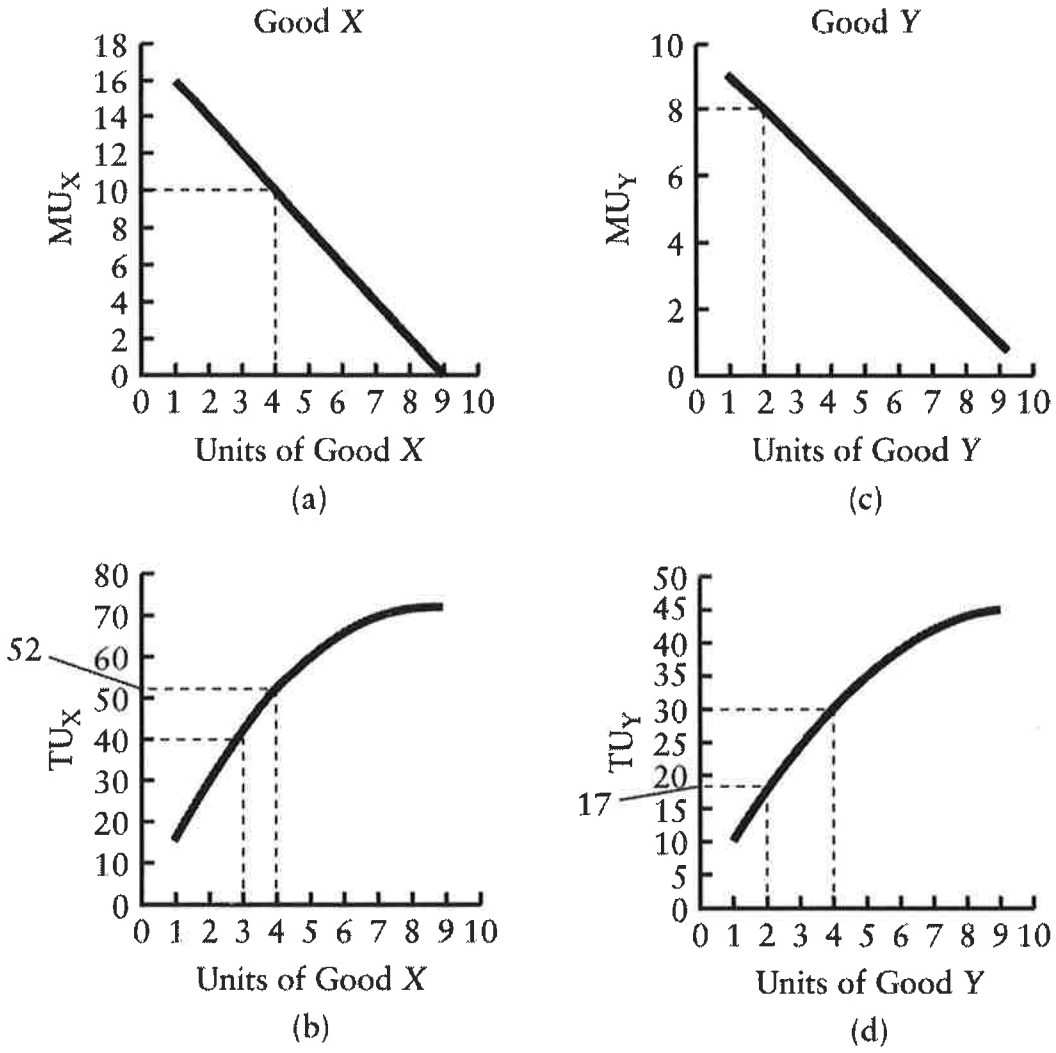


FIGURE 6-2

15) Refer to Figure 6-2. Suppose the price of X is \$2, the price of Y is \$1, and the consumer's income is \$10. The consumer is currently buying 4 units of good X and 2 units of good Y. In order to maximize his utility, he should
   A) buy more of X but the same amount Y.
   B) make no changes — he is already maximizing his total utility.
   C) buy more of X and less Y.
   D) buy more Y and less X.
   E) buy the same amount of X but less Y.

16) Assume you are consuming two goods, X and Y. Suppose the absolute prices for X and Y remain unchanged, but your money income falls by 50%. What happens to your consumption of good X?
   A) it increases
   B) it stays the same
   C) it decreases
   D) it decreases by 50%
   E) it increases or decreases, depending on whether it is normal or inferior

The table below shows the total value (in dollars) that Andrew gets from playing 9-hole rounds of golf.

Rounds of Golf per Month	Total Value ($)
0	0
1	40
2	70
3	92
4	108
5	120
6	130
7	130

TABLE 6-3

17) Refer to Table 6-3. If the price of a 9-hole round of golf is $16, and Andrew is maximizing his utility, then his consumer surplus will be
A) $92. B) $16. C) $108. D) $44. E) $310.

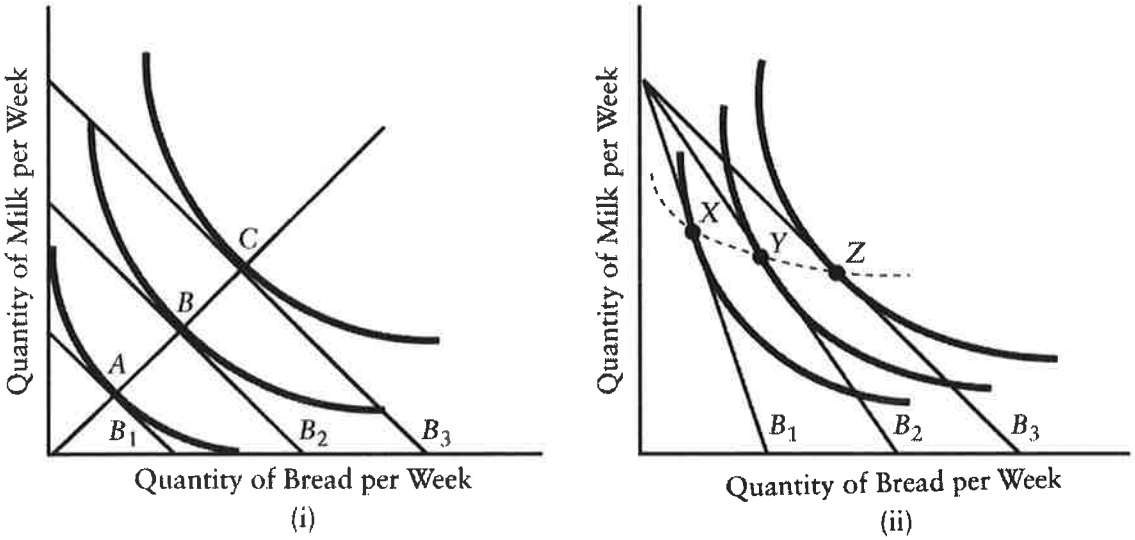


FIGURE 6-9

18) Refer to Figure 6-9. In part (ii), the consumer's move from point X to point Z is caused by
A) a decrease in the price of bread.
B) an increase in the price of bread.
C) a decrease in the price of milk.
D) a change in the consumer's preferences towards bread.
E) an increase in money income.

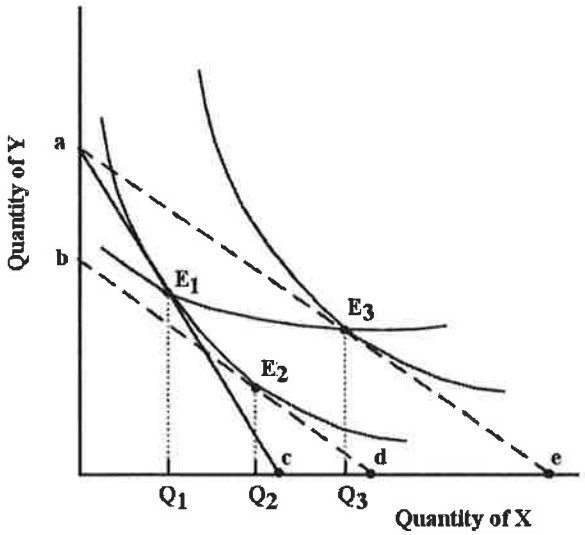


FIGURE 6-11

19) Refer to Figure 6-11. The line joining points E1 and E3 is known as _____, which shows how _____.
A) an income consumption line; consumption changes as income changes, with relative prices held constant
B) a price consumption line; consumption changes as one price changes, with money income held constant
C) a price consumption line; consumption changes as money income and relative prices change
D) an income consumption line; consumption changes with changing relative prices and constant income

20) Consider a house-construction firm with fixed capital. The firm can build 8 houses per year with 16 workers and 8.8 houses per year with 17 workers. If it is currently building 8.8 houses per year, which of the following is true?
A) Average product is at a maximum with 16 workers.
B) Average product is at a maximum with 17 workers.
C) The firm has already passed the point of diminishing marginal productivity.
D) The marginal product is below the average product.
E) The firm has not yet reached the point of diminishing average productivity.

The diagram below shows some short-run cost curves for a firm.

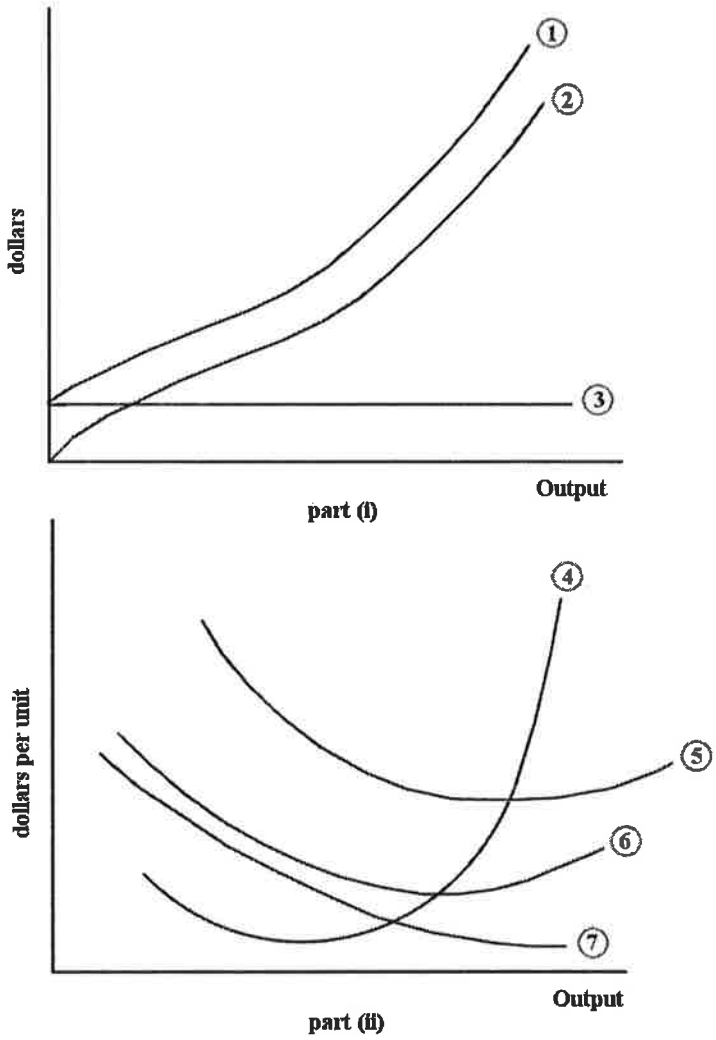


FIGURE 7-2

21) Refer to Figure 7-2. Which of the following choices correctly identifies the cost curves in part (i) of the figure?
A) Curve 1 is the total fixed cost curve.
Curve 2 is the total variable cost curve.
Curve 3 is the total cost curve.
B) Curve 1 is the total cost curve.
Curve 2 is the total variable cost curve.
Curve 3 is the average fixed cost curve.
C) Curve 1 is the total cost curve.
Curve 2 is the total variable cost curve.
Curve 3 is the total fixed cost curve.
D) Curve 1 is the total variable cost curve.
Curve 2 is the total cost curve.
Curve 3 is the total fixed cost curve.
E) Curve 1 is the total marginal cost curve.
Curve 2 is the total average cost curve.
Curve 3 is the total average fixed cost curve.

The figure below shows a family of cost curves for a firm. The subscripts 1, 2, and 3 for the SRATC curves refer to different plant sizes.

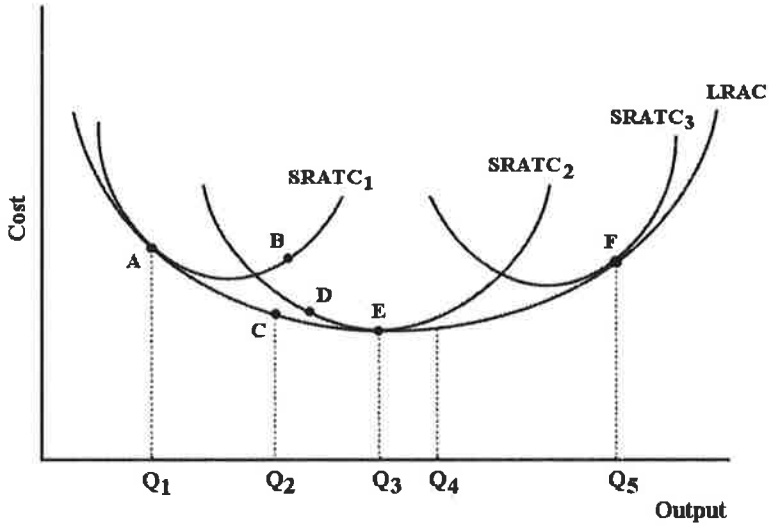


FIGURE 8-3

22) Refer to Figure 8-3. Should this profit-maximizing firm ever consider moving from point E (output level Q3 on SRATC2) to point F (output level Q5 on SRATC3)?
A) Yes, if the product price rises enough to lead the firm to expand to plant size 3.
B) No, because they are already producing at their lowest possible cost at point E.
C) No, because producing at point F implies a higher cost per unit of output.
D) Yes, because the firm can take advantage of economies of scale.
E) Yes, because SRATC3 is the optimal plant size for this firm.

23) Suppose RioTintoAlcan is considering the construction of a new aluminum smelter in Northern Quebec, the operation of which requires a great deal of electricity. Suppose also that the price of electricity is predicted to rise significantly in the near future. As a result, the firm decides to embark on new research and development which leads to the development of a new production technique that uses less electricity per tonne of aluminum produced. This is an example of
A) innovation away from increases in factor prices.
B) short-run profit maximization.
C) long-run economies of scale.
D) short-run cost minimization.
E) the marginal rate of substitution between factors.

Consider the price and quantity data below for a perfectly competitive firm producing mousetraps.

Price ($)	Quantity
5	1000
5	1250
5	1500
5	1750
5	2000

TABLE 9-1

24) Refer to Table 9-1. Suppose this firm is currently selling 1750 mousetraps at the market price of $5. If the firm raises its price to $6, it's average revenue will be
A) $6.
B) $0.
C) greater than $6.
D) between $5 and $6.
E) $5.

25) Suppose that in a perfectly competitive industry, the market price of the product is $12. Firm A is producing the output level at which average total cost equals marginal cost, both of which are $10. To maximize its profits, Firm A should
A) reduce its output.
B) increase its advertising.
C) change the price of the product.
D) expand its output.
E) leave its output unchanged.

The diagram below shows the short-run cost curves for 3 perfectly competitive firms in the same industry.

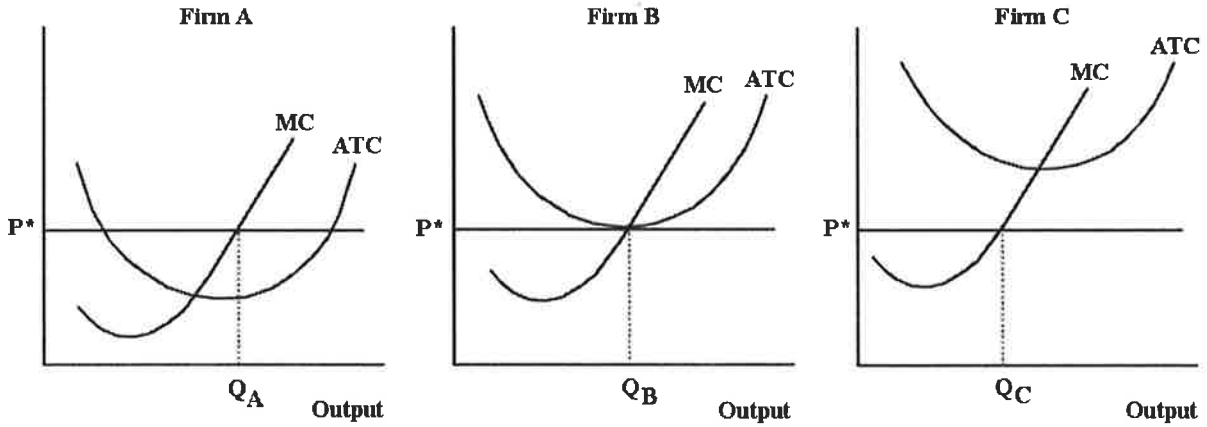


FIGURE 9-6

26) Refer to Figure 9-6. Which firm or firms is likely to exit this industry?
A) Firm A
B) Firm B
C) Firm C
D) all of Firms A, B, and C
E) none of Firms A, B, and C

27) Natural barriers to firms to entering an industry include
A) large economies of scale in the industry.
B) a patent which allows production by only the patent holder.
C) increasing-cost production.
D) control or ownership of the entire supply of an essential raw material.
E) a government-awarded franchise.

28) A cartel can only succeed in the long run
A) if the long-run market supply curve is elastic.
B) if all firms are experiencing decreasing returns to scale.
C) if there is free entry of new firms.
D) with authorization from the government.
E) if member firms cooperate and resist their individual incentives.

29) Consider a monopolist that is able to distinguish between two distinct market segments, A and B, for its product. Marginal cost is constant at $18 for each unit produced. The firm is currently selling its output at a single price and allocating its output across segments such that marginal revenue in segment A is $25 and marginal revenue in segment B is $15. How can this firm maximize its profit?
A) maintain the current output and its allocation across segments
B) decrease the output in segments A and B
C) decrease the output in segment A and increase the output in segment B
D) increase the output in segment A and decrease the output in segment B
E) increase the output in segments A and B

30) The excess-capacity theorem predicts that
A) monopolistic firms will achieve positive economic profits by restricting output below the economically efficient level at which average total costs are minimized.
B) all firms in a perfectly competitive industry will produce at a lower output level than that which minimizes average total costs.
C) when price-taking firms maximize their profits by setting price equal to marginal cost, each firm operates with some excess capacity.
D) profit-maximizing firms will always choose to operate with some degree of excess capacity, in order to be flexible in the face of shifts in demand.
E) long-run equilibrium in a monopolistically competitive industry occurs with all firms producing at a lower output level than that which minimizes average total costs.

The payoff matrix below shows the payoffs to Firms A and B from producing different levels of output. The numbers in parentheses are (payoff to A, payoff to B).

		Firm B	
		Produce 1000 Units	**Produce 2000 Units**
Firm A	**Produce 1000 Units**	(100, 100)	(10, 150)
	Produce 2000 Units	(150, 10)	(30, 30)

TABLE 11-3

31) Refer to Table 11-3. From the payoff matrix we can infer that
A) both firms are indifferent between an equilibrium (Produce 1000 units, Produce 1000 units) and (Produce 2000 units, Produce 2000 units).
B) it is optimal for Firm A to produce 1000 units of output regardless of what Firm B is doing.
C) it is optimal for Firm A to produce 2000 units of output regardless of what Firm B is doing.
D) it is optimal for Firm B to produce 1000 units of output regardless of what Firm A is doing.
E) there is no Nash equilibrium in the game.

32) The sugar industry in Canada is effectively a duopoly with two large firms competing with each other for market share. Suppose the two firms collude and successfully restrict joint output to that of a profit-maximizing monopolist. As a result, they each realize an increase in their profits. Why would this collusive agreement be difficult to sustain?
A) Because a non-cooperative outcome is inevitable in which output is further restricted and each firm's profit is reduced.
B) Because each firm has an incentive to break the agreement by further restricting output in order to increase the price, thereby increasing their own profits.
C) Because the firm with the lower long-run average costs will be able to capture all sales, driving the second firm out of the market.
D) Because each firm has an incentive to break the agreement by increasing output in order to increase their own profits.

The diagram below shows the demand and supply curves in a perfectly competitive market.

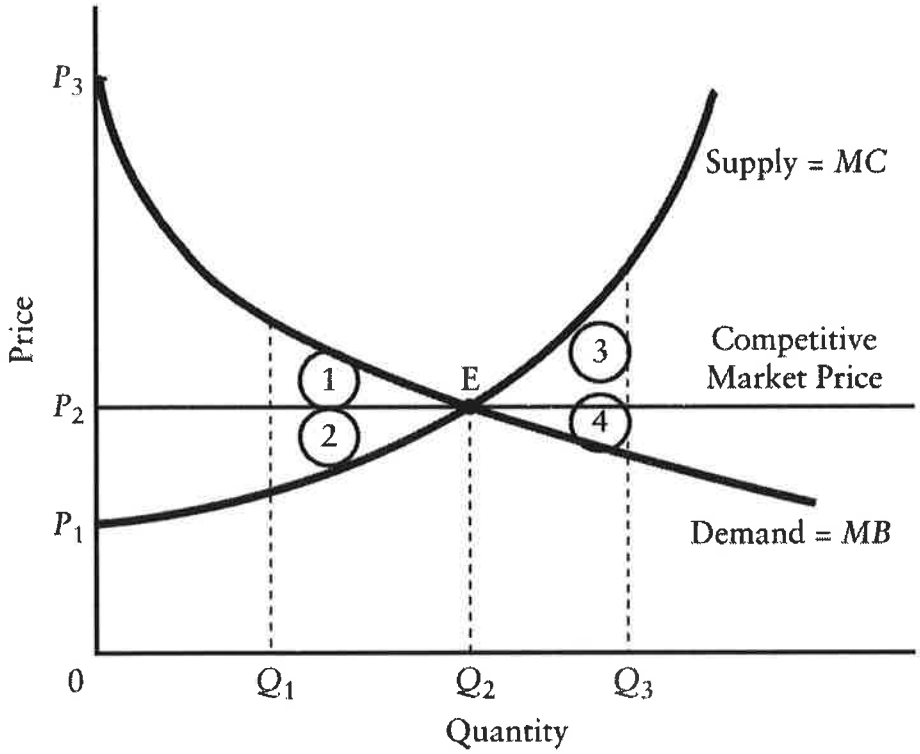


FIGURE 12-5

33) Refer to Figure 12-5. If output in this market were Q_3, the loss in total economic surplus relative to the competitive equilibrium would be illustrated by area

A) 1. B) 2. C) 3. D) 4. E) 3 + 4.

34) There has been a trend toward less government regulation and ownership in oligopolistic industries in most industrialized countries since the 1980s. One reason for this is

A) policymakers came to understand that many oligopolistic firms were producing output levels that resulted in allocative efficiency.

B) policymakers came to understand that many oligopolistic firms were operating at their minimum efficient scale, thereby producing an efficient outcome.

C) policymakers realized that they did not have effective tools for promoting efficiency.

D) domestic firms are now exposed to more international competition due to falling transportation and communication costs.

E) Canada's Competition Bureau, and similar agencies in other countries were so successful at promoting competition that such regulation is no longer required.

35) Suppose there are *only* two firms (Firms A and B) in Canada that produce good X, and the two firms propose a merger to create a single firm (Firm AB). Is there any circumstance under which the authorities enforcing Canadian competition policy might approve of such a merger?
   A) According to the *Competition Act,* if the merged firm enhances the status of a Canadian cultural industry.
   B) According to the *Competition Act,* as long as the revenues of the merged firm are less than $100 million per year.
   C) If international trade in good X is such that Firm AB faces a fully competitive environment, both within and outside of Canada's borders.
   D) If the market is defined as being within Canada's borders, and the merger allows Firm AB to exploit economies of scale.

The diagram below shows the MRP curve for a firm producing copper plumbing pipe. The factor of production being considered here is hours of labour.

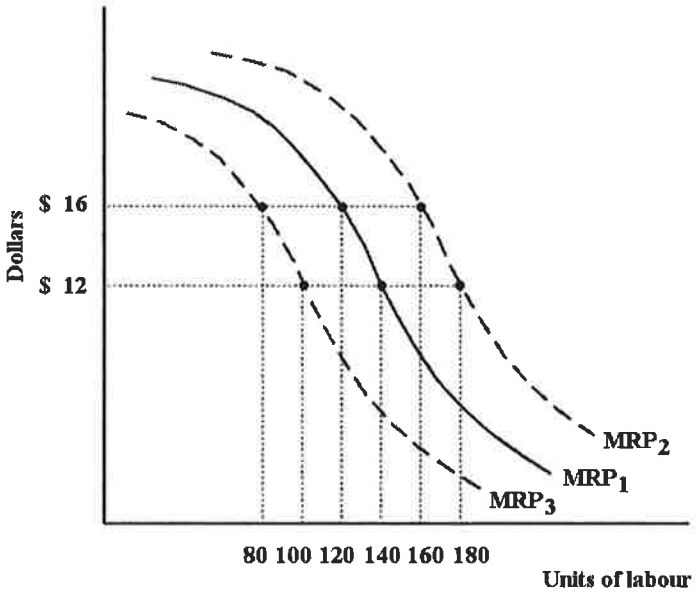


FIGURE 13-1

36) Refer to Figure 13-1. Suppose this firm is facing MRP_1, a wage rate of $16 per hour and is employing 100 units of labour. At this level of employment,
   A) the last unit of labour is adding less to the firm's cost than it is adding to the firm's revenue, so it should increase the use of labour.
   B) the last unit of labour is adding more to the firm's cost than it is adding to the firm's revenue, so it should reduce the use of labour.
   C) the last unit of labour contributes as much to the firm's costs as to the firm's revenues and so the firm should not change its use of labour.
   D) the firm has shifted the MRP curve to MRP_3.
   E) the firm has shifted the MRP curve to MRP_2.

The three diagrams below each show a supply curve for oil tankers over a relatively short period of time.

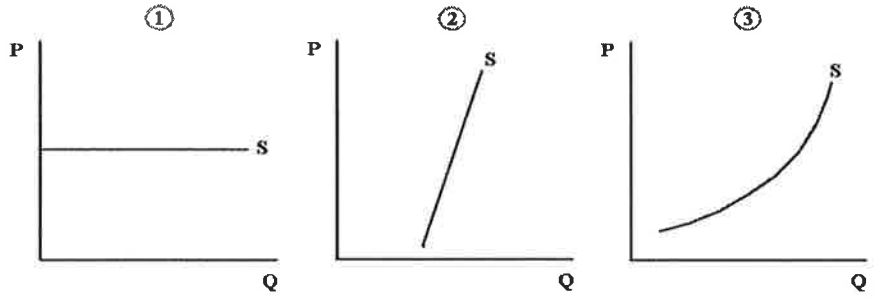


FIGURE 13–3

37) Refer to Figure 13–3. Consider the supply of oil tankers to an individual Canadian shipping firm, the North American shipping industry, and the world shipping industry. Which diagram best shows the supply of oil tankers that is relevant to the North American shipping industry?
A) diagram 1
B) diagram 2
C) diagram 3
D) diagrams 2 or 3
E) diagrams 1 or 2

The demand and supply curves shown below apply to a competitive market for a factor used in the production of widgets.

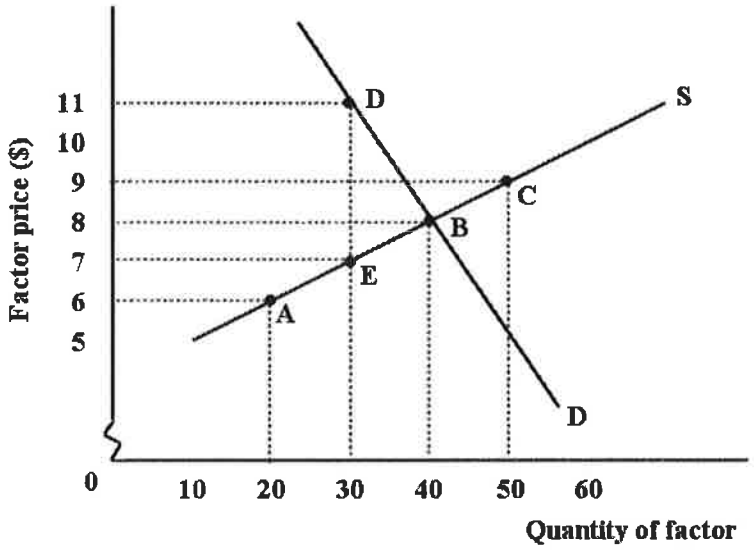


FIGURE 13–2

38) Refer to Figure 13–2. This factor market is in equilibrium at point B. In equilibrium, the 20th unit of the factor is being paid transfer earnings of _____ and economic rent of _____.
A) $6; $2 B) $16; $2 C) $120; -$2 D) $320; $80 E) $120; $40

39) Consider the following statement: "Canada is unambiguously better off if it is exporting more, in dollar value, to the rest of the world than it is importing." This statement is _____ because _____.
A) incorrect; it fails to recognize that the gains from trade come from the volume rather than the balance of trade
B) correct; exports are good and imports are bad
C) incorrect; imports improve Canada's terms of trade
D) correct; it is based on the mercantilist doctrine
E) incorrect; it does not recognize the operation of the foreign-exchange market

40) Suppose Canada has a 20% tariff on the import of carpets, and Canada currently imports this product from India at a with-tariff price of $22. The with-tariff price of identical carpets from the United States is $24. Now suppose a free-trade agreement with the U.S. eliminates the tariff and so the no-tariff price from the U.S. is $20. Canada now purchases carpets from the U.S. Is Canada made better off from this trade diversion?
A) No, because before the agreement Canada was buying from India at a lower (pre-tariff) price and collecting tariff revenue.
B) Yes, because Canadian consumers are paying less for carpets and consumer surplus has increased.
C) No, because it would still be cheaper for individual consumers to buy carpets from India.
D) Yes, because Canada has diverted trade toward the United States.
E) Canada is not better or worse off. The gain in consumer surplus in Canada is identical to the loss in tariff revenue to the Canadian government.

Part B: TRUE/FALSE/UNCERTAIN QUESTIONS

*Choose **FOUR** of the following **SIX** statements. For each chosen statement, explain why the statement is True, False or Uncertain. A diagram and(or) a few lines of explanation should be sufficient.*

Unsupported answers will receive no marks.

B1. Price discrimination will cause allocative inefficiency.

B2. Producers will bear a larger burden of a sales tax if demand is relatively inelastic and supply is relatively elastic.

B3. Suppose there are only two firms in a special industry. If they each set a high price, they each earn $10000. If they each set a low price, they each earn $1000. If one firm sets a low price while the other sets a high price, the low-price firm earns $8000 while the high-price firm earns $2000. A prisoners' dilemma exists in the game.

B4. Kobe Bryant is a highly paid professional basketball player in the *National Basketball Association*. From the perspective of the whole NBA, Kobe Bryant's economic rent would be very small, while from the perspective of his individual team it would be very large.

B5. The main difference between a tariff and an "equivalent" voluntary export restriction (VER) is: A tariff allows the extra market value of the good to accrue to the supplier, but a VER allows the extra market value to be appropriated by the government of the importing country.

B6. For a perfectly competitive firm, price should equal average cost in the short run, but not necessarily in the long run.

Part C: PROBLEM SOLVING QUESTIONS

*Choose **ONE** of the following **TWO** questions.*

Answer all parts and show all your reasoning and calculation.

C1.

Suppose the demand and supply curves for milk in Canada are given by

$$Q^D = 200 - 2P$$

$$Q^S = \frac{1}{2}P - 8$$

a) Calculate the equilibrium price (P^*) and the equilibrium quantity (Q^*). Graph the supply and demand curves and identify the equilibrium values in a diagram (label all axes and curves, identify the P and Q intercepts).

b) Calculate the elasticity of demand at the equilibrium point in part a). If the supply of milk decreased, would total expenditure on milk rise or fall? Explain.

c) Suppose the government imposes a quota of 30 units ($\bar{Q} = 30$). What is the new price? Show the change in consumer surplus from this policy (relative to the free market equilibrium in part a)) in your diagram.

Now, suppose the world price for milk is $P^W = 20$.

d) If the economy (as described in part a)) opens to trade, does Canada import or export milk? What quantity of milk is traded? Sketch a diagram and identify the consumer surplus (CS) and producer surplus (PS) with free trade.

e) Now suppose the government imposes a tariff of $t = 5$ on each unit of milk imported. Sketch a diagram and identify i) the deadweight loss (DWL) from the tariff relative to free trade and ii) the tariff revenue.

C2.

Suppose a natural monopoly's total cost and marginal cost are given by

$$C = 20 + 5Q$$

$$MC = 5$$

and it faces (inverse) demand and marginal revenue given by

$$P = 25 - 2Q$$

$$MR = 25 - 4Q$$

a) Calculate the monopoly price, the monopoly output, and the monopoly profits.

b) Calculate the average total cost at the monopoly output. Graph the demand, marginal revenue (MR), average total cost (ATC), and marginal cost (MC) curves (label all axes and curves). Add the monopoly price and monopoly output from part a) to the graph.

c) Calculate the dead weight loss (DWL) from the monopoly. Identify the area of the deadweight loss on your graph.

d) If the government regulates the monopoly with average-cost pricing, what is the price and output? Compare this output to the monopoly output without regulation. Does this policy result in allocative efficiency?

e) Suppose demand falls so that the monopoly output is 10 and the monopoly price is 7. Will the monopoly produce any output in the short run? Will the monopoly produce in the long-run? Explain.