

AP MICROECONOMICS Test 1

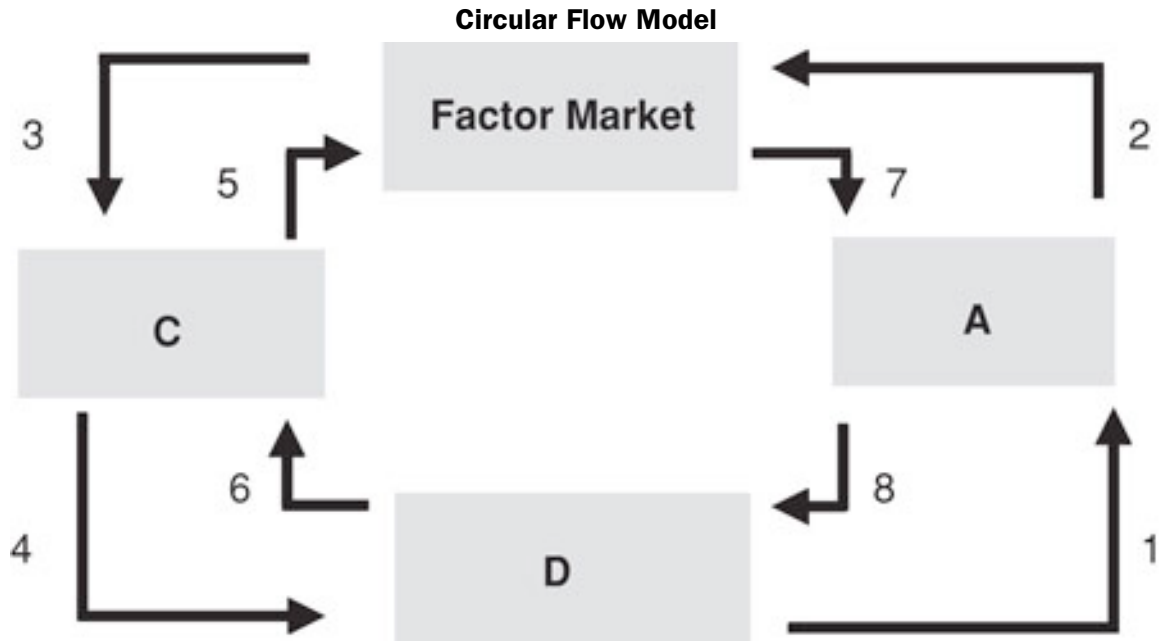
1. The primary focus of microeconomics is
 - (A) the aggregate supply and aggregate demand resultant output.
 - (B) unlimited resources and unlimited wants.
 - (C) the specific economic components that make up the economic system.
 - (D) concealment of detailed information about specific segments of the economy.
 - (E) manipulating overall performance of the economic system.

2. Economic efficiency is mainly concerned with
 - (A) the limited wants–unlimited resources dilemma.
 - (B) considerations of equity in the distribution of wealth.
 - (C) obtaining the maximum output from available resources.
 - (D) creating the greatest societal satisfaction from resources.
 - (E) the transfer of wealth in an equitable fashion.

3. A production possibilities curve is “bowed out” from the origin because
 - (A) input resources are not equally efficient in producing two alternative goods.
 - (B) Keynes recognized this reality and modern economists follow his theory.
 - (C) specialization of output increases input potential.
 - (D) resources are scarce.
 - (E) wants are virtually unlimited.

4. Opportunity cost
 - (A) is reflected in the convex curve of cost models.
 - (B) does not apply to socialistic economies, because of central planning.
 - (C) suggests that the use of resources in any particular line of production means that alternative outputs must be forgone.
 - (D) is irrelevant if the production possibilities curve is shifting to the right.

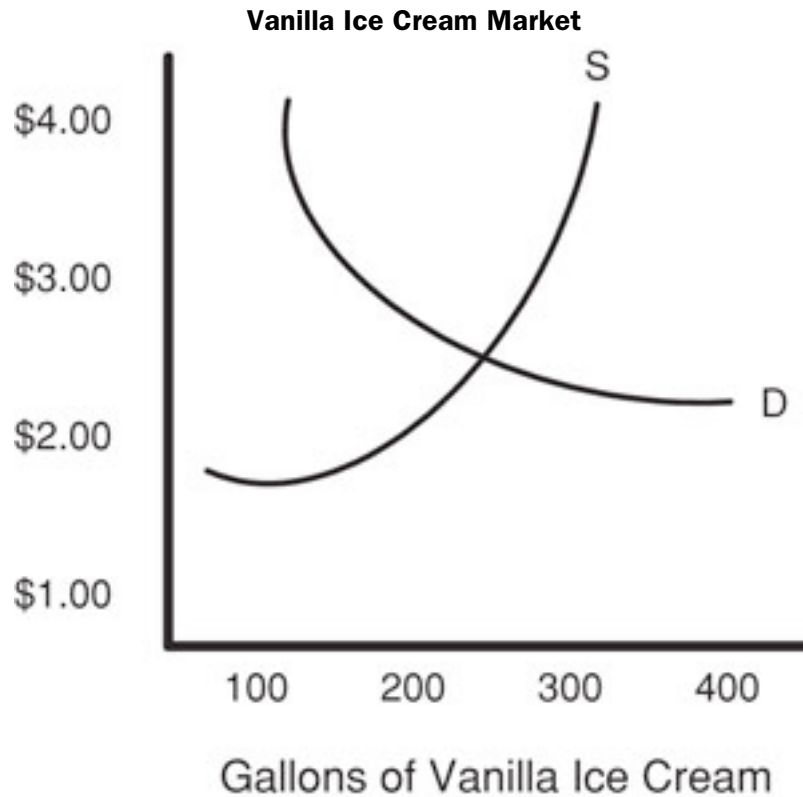
(E) suggests that insatiable wants can be fulfilled.



5. In the preceding circular flow model of a free market economy, flow (4) represents
 - (A) wage, rent, interest, and profit income.
 - (B) land, labor, capital, and entrepreneurial ability.
 - (C) goods and services brought to the product market.
 - (D) consumer expenditures.
 - (E) costs of production.

6. “As the retail price of a good increases, consumers shift their purchases to other products whose prices are now relatively lower.” This statement describes
 - (A) an inferior good.
 - (B) the rationing function of prices.
 - (C) the substitution effect.
 - (D) opportunity cost.
 - (E) the income effect.

7. If the demand curve for product B shifts to the right as the price of product A declines, it can be concluded that
- (A) A and B are both inferior goods.
 - (B) A is a superior good and B is an inferior good.
 - (C) A is an inferior good and B is a superior good.
 - (D) A and B are complementary goods.
 - (E) A and B are substitute goods.
8. Assume that the demand schedule for concrete is downward sloping. If the price of concrete falls from \$2.50 to \$2.00 a pound
- (A) the quantity demanded of concrete will decrease.
 - (B) the demand for concrete will decrease.
 - (C) the quantity demanded of concrete will increase.
 - (D) the demand for concrete will increase.
 - (E) the demand for concrete will shift to the left.
9. Assume that a drought in Kansas reduces the supply of barley. Barley is a basic ingredient in the production of beer, and wine is a consumer substitute for beer. Therefore, we would expect the price of beer to
- (A) rise, the supply of beer to increase, and the demand for wine to increase.
 - (B) rise, the supply of beer to decrease, and the demand for wine to increase.
 - (C) rise, the supply of beer to decrease, and the demand for wine to decrease.
 - (D) fall, the supply of beer to increase, and the demand for wine to increase.
 - (E) None of the above



10. Refer to the preceding diagram. The equilibrium price and quantity in the vanilla ice cream market will be approximately
- (A) \$1.00 and 200.
 - (B) \$1.60 and 130.
 - (C) \$0.50 and 130.
 - (D) \$1.60 and 290.
 - (E) \$2.50 and 250.
11. Specialization in production is desirable because it
- (A) allows everyone to have a job that he or she likes.
 - (B) permits the production of a larger output with fixed amounts of resources.
 - (C) facilitates trade by bartering.
 - (D) increases output of goods at higher prices.
 - (E) guarantees full employment.

Answer question 12 on the basis of the following information: Suppose 30 units of product A can be produced by employing just labor and capital in the four ways shown below. Assume that the prices of labor and capital are \$2 and \$3 respectively.

Production techniques possible combinations:

	I	II	III	IV
Labor	4	3	2	5
Capital	2	3	5	1

12. Assuming that the price of product A is \$0.50 and that all 30 units will be sold, the firm will realize
- (A) an economic profit of \$4.
 - (B) an economic profit of \$2.
 - (C) an economic profit of \$6.
 - (D) a loss of \$6.
 - (E) a loss of \$3.

13. Assume that a normal good is being produced in a competitive industry that is in long-run equilibrium. If average consumer income increased, which of the following combinations would result?

	Output	Price	# of Firms in Industry
(A)	Decrease	Decrease	Exit
(B)	Decrease	Decrease	Enter
(C)	Increase	Decrease	Exit
(D)	Decrease	Increase	Exit
(E)	Increase	Increase	Enter

14. The free market system does not produce public goods because
- I. there is inadequate demand for such goods.
 - II. people who do not pay for the goods cannot be prevented from consuming them.
 - III. collecting revenue from production of such goods is difficult.
- (A) I only

- (B) II only
- (C) III only
- (D) Both I and III
- (E) Both II and III

15. The price of product X is reduced from \$100 to \$90. As a result, the quantity demanded increases from 50 to 60 units. Therefore, demand for X in this price elasticity range

- (A) has declined.
- (B) is of unit elasticity.
- (C) is inelastic.
- (D) results in lower total revenue for firms.
- (E) is elastic.

16. Suppose that a 20 percent increase in the price of normal good Y causes a 10 percent decline in the quantity demanded of normal good X. The coefficient of cross elasticity of demand is

- (A) negative, and therefore these goods are substitutes.
- (B) negative, and thus income sensitive.
- (C) negative, and therefore these goods are complements.
- (D) positive, and therefore these goods are substitutes.
- (E) positive, and therefore these goods are complements.

17. Assume that a 3 percent increase in income in the economy produces a 1 percent decline in the quantity demanded of good X. The outcome would be

- | Coefficient of Income Elasticity | Type of Good X is: |
|----------------------------------|--------------------|
| (A) negative | inferior good |
| (B) negative | normal good |
| (C) positive | inferior good |
| (D) positive | normal good |
| (E) negative | unrelated |

18. The first sport drink yields Craig 18 units of utility and the second yields him an additional 12 units of utility. His total utility from three sport drinks is 36 units of utility. The marginal utility of the third sport drink is
- (A) 26 units of utility.
 - (B) 6 units of utility.
 - (C) 8 units of utility.
 - (D) 54 total utils.
 - (E) 38 total utils.

Answer questions 19 and 20 on the basis of the following table, which shows the amounts of additional satisfaction (marginal utility) that a consumer derives from successive quantities of products X and Y.

Units of X	MU_x	Units of Y	MU_y
1	56	1	32
2	48	2	28
3	32	3	24
4	24	4	20
5	20	5	12
6	16	6	10
7	12	7	8

19. Refer to the preceding data. If the consumer has a money income of \$52 and the prices of X and Y are \$8 and \$4 respectively, the consumer will maximize her utility by purchasing
- (A) 2 units of X and 7 units of Y.
 - (B) 5 units of X and 5 units of Y.
 - (C) 4 units of X and 5 units of Y.
 - (D) 3 units of X and 6 units of Y.
 - (E) 6 units of X and 3 units of Y.

20. Suppose that MU_X/P_X is greater than MU_Y/P_Y . To maximize utility, consumers who are spending their entire budget should alter their consumption so that they purchase
- (A) less of X, but only if its price rises.
 - (B) more of Y, but only if its price rises.
 - (C) more of Y and less of X.
 - (D) neither; it should utilize the savings utility.
 - (E) more of X and less of Y.
21. "Total cost," for an economist, includes
- (A) explicit and implicit costs, including a normal profit.
 - (B) neither implicit nor explicit costs.
 - (C) implicit, but not explicit, costs.
 - (D) explicit, but not implicit, costs.
 - (E) explicit and implicit costs, including an economic profit.
22. The main characteristic of supply in the short run is that
- (A) barriers to entry prevent new firms from entering the industry.
 - (B) the firm does not have sufficient time to change the size of its plant.
 - (C) the firm does not have sufficient time to cut its rate of output to zero.
 - (D) a firm does not have sufficient time to change the amounts of any of the resources it employs.
 - (E) revenue is fixed.
23. Marginal product is
- (A) the increase in total output attributable to the employment of one more worker.
 - (B) the increase in total revenue attributable to the employment of one more worker.
 - (C) the increase in total product divided by the change in revenue.
 - (D) the increase in total cost attributable to the employment of one more worker.
 - (E) total product divided by the number of workers employed.

24. The law of diminishing returns indicates that
- (A) as revenue increases with each sale, total revenue declines.
 - (B) as extra units of a variable resource are added to a fixed resource, marginal product will decline beyond some point.
 - (C) because of economies and diseconomies of scale, a competitive firm's long-run average total cost curve will be U-shaped.
 - (D) the demand for goods produced by purely competitive industries is downsloping.
 - (E) beyond some point, the extra utility derived from additional units of a product will yield the consumer smaller and smaller extra amounts of satisfaction.

Answer question 25 on the basis of the following output data for a firm. Assume that the amounts of all nonlabor resources are fixed.

Number of Workers	Units of Output
0	0
1	40
2	90
3	126
4	150
5	165
6	180

25. Refer to the preceding data. The marginal product of the sixth worker is
- (A) 180 units of output.
 - (B) 30 units of output.
 - (C) 45 units of output.

- (D) 15 units of output.
- (E) negative 15 units of output.

26. Marginal product

- (A) diminishes at all levels of production.
- (B) increases at all levels of production.
- (C) may initially increase, then diminish, but never become negative.
- (D) may initially increase, then diminish, and ultimately become negative.
- (E) is always less than average product.

27. If you owned a small farm, which of the following would be a fixed cost?

- (A) Farm workers
- (B) Flood insurance
- (C) Gasoline
- (D) Pesticide
- (E) Seed

28. If you operated a small pizzeria, which of the following would be a variable cost in the short run?

- (A) Baking ovens
- (B) Interest on business loans
- (C) Annual lease payment for use of the building
- (D) Cheese toppings
- (E) Fire insurance

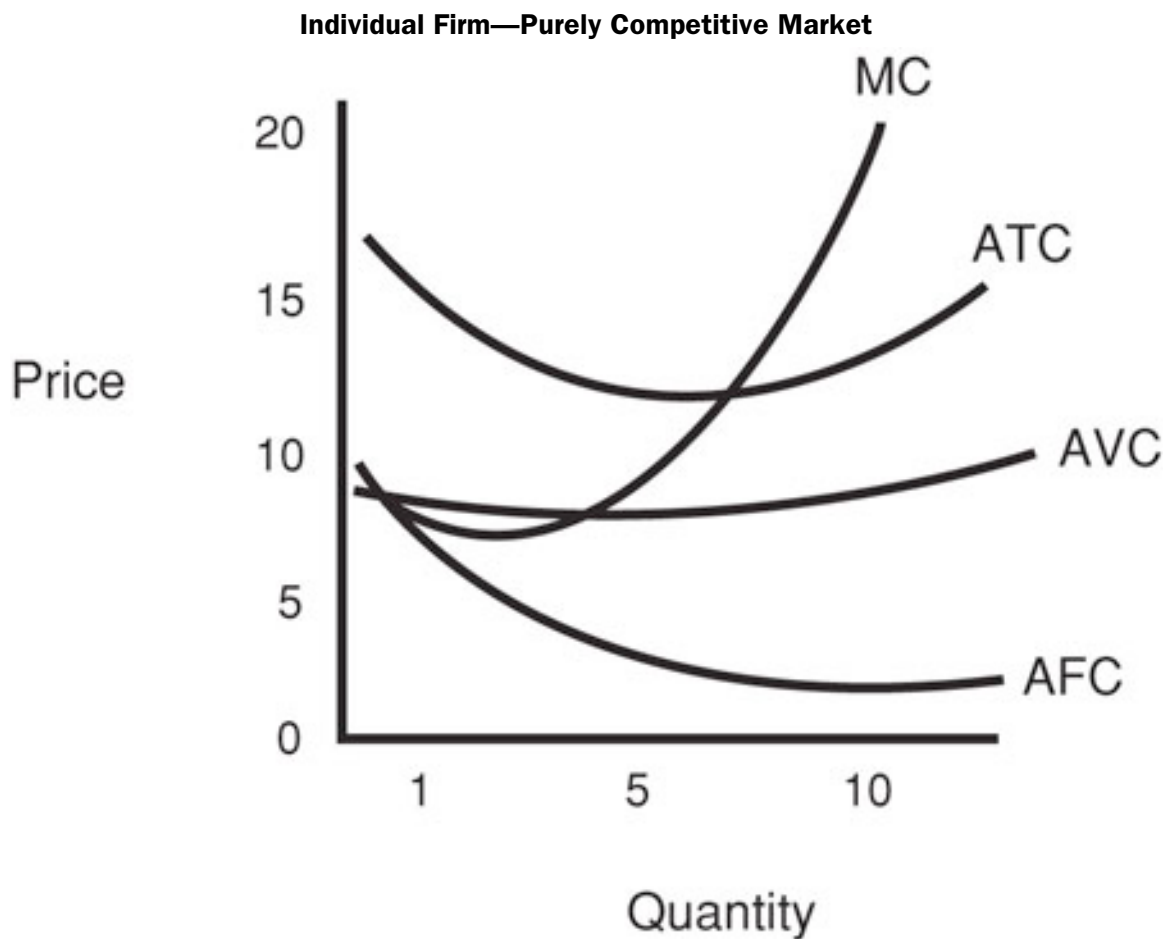
29. Marginal cost is the

- (A) rate of change in total fixed cost that results from producing one more unit of output.
- (B) change in total cost that results from producing one more unit of output.
- (C) increase in revenue caused by one more unit being consumed.

- (D) change in average variable cost that results from producing one more unit of output.
- (E) change in average total cost that results from producing one more unit of output.

30. Average fixed cost

- (A) equals marginal cost when average total cost is at its minimum.
- (B) may be found for any output by adding average variable cost and average total cost.
- (C) at some point begins to increase as output reduces.
- (D) is graphed as a U-shaped curve.
- (E) declines continually as output increases.



31. Refer to the preceding diagram. The vertical distance between ATC and AVC reflects
- (A) the law of diminishing returns.
 - (B) the breakeven point.
 - (C) the average fixed cost at each level of output.
 - (D) marginal cost at each level of output.
 - (E) the presence of economies of scale.
32. If a technological advance reduces the amount of labor needed to produce an increased level of output, then
- (A) the AVC curve will shift upward.
 - (B) the MC curve will shift upward.
 - (C) the ATC curve will shift downward.
 - (D) the AFC curve will shift upward.
 - (E) all of the above will occur.

Answer question 33 on the basis of the following cost data.

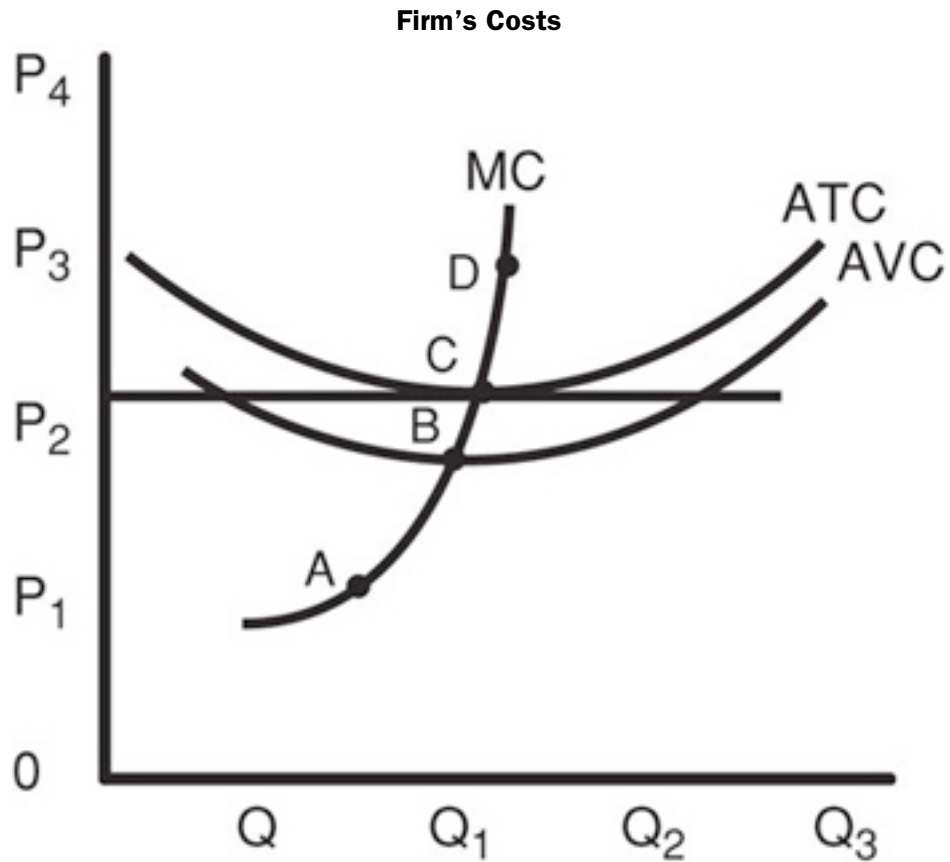
Output	Average Fixed Cost	Average Variable Cost
1	\$50.00	\$100.00
2	25.00	80.00
3	16.67	66.67
4	12.50	65.00
5	10.00	68.00
6	8.33	73.33
7	7.14	80.00
8	6.25	87.50

33. Based upon the preceding table, if the firm decided to increase its output from 6 to 7 units, by how much would its total costs rise?
- (A) \$170.00
 - (B) \$80.00
 - (C) \$6.67
 - (D) \$120.02
 - (E) \$108.02
34. In the short run, a purely competitive firm that seeks to maximize profit will produce
- (A) where marginal revenue intersects demand.
 - (B) where the demand and ATC curves intersect.
 - (C) where total revenue exceeds total cost by the maximum amount.
 - (D) that output where economic profits are zero.
 - (E) at any point where the total revenue and total cost curves intersect.
35. A firm reaches a breakeven point (normal profit position) where
- (A) marginal revenue cuts the horizontal axis.
 - (B) marginal cost intersects the average variable cost curve.
 - (C) total revenue equals total variable cost.
 - (D) total revenue and total cost are equal.
 - (E) total revenue equals all explicit costs.
36. The $MR = MC$ rule applies
- (A) to firms in all types of industries.
 - (B) to firms only in a natural monopoly.
 - (C) only when the firm is a “price taker.”
 - (D) only to monopolies.
 - (E) only to purely competitive firms.

Answer question 37 on the basis of the following data confronting a firm.

Output	Marginal Revenue	Marginal Cost
0	—	—
1	\$16	\$10
2	16	9
3	16	13
4	16	17
5	16	21

37. Refer to the preceding data. If the firm's minimum average variable cost is \$10, the firm's profit-maximizing level of output would be
- (A) 2.
 - (B) 3.
 - (C) 4.
 - (D) 5.
 - (E) 1.



38. Refer to the preceding diagram for a purely competitive producer. The lowest price at which the firm should produce (as opposed to shutting down)
- (A) is P_1 .
 - (B) is P_2 .
 - (C) is P_3 .
 - (D) is P_4 .
 - (E) is P_5 .

Answer question 39 on the basis of the following cost data for a firm that is selling in a purely competitive market.

Average Total Product	Average Fixed Cost	Average Variable Cost	Total Cost	Marginal Cost
1	\$100.00	\$17.00	\$117.00	\$17
2	50.00	16.00	66.00	15
3	33.33	15.00	48.33	13
4	25.00	14.25	39.25	12
5	20.00	14.00	34.00	13
6	16.67	14.00	30.67	14
7	14.29	15.71	30.00	26
8	12.50	17.50	30.00	30
9	11.11	19.44	30.55	35
10	10.00	21.60	31.60	41
11	9.09	24.00	33.09	48
12	8.33	26.67	35.00	56

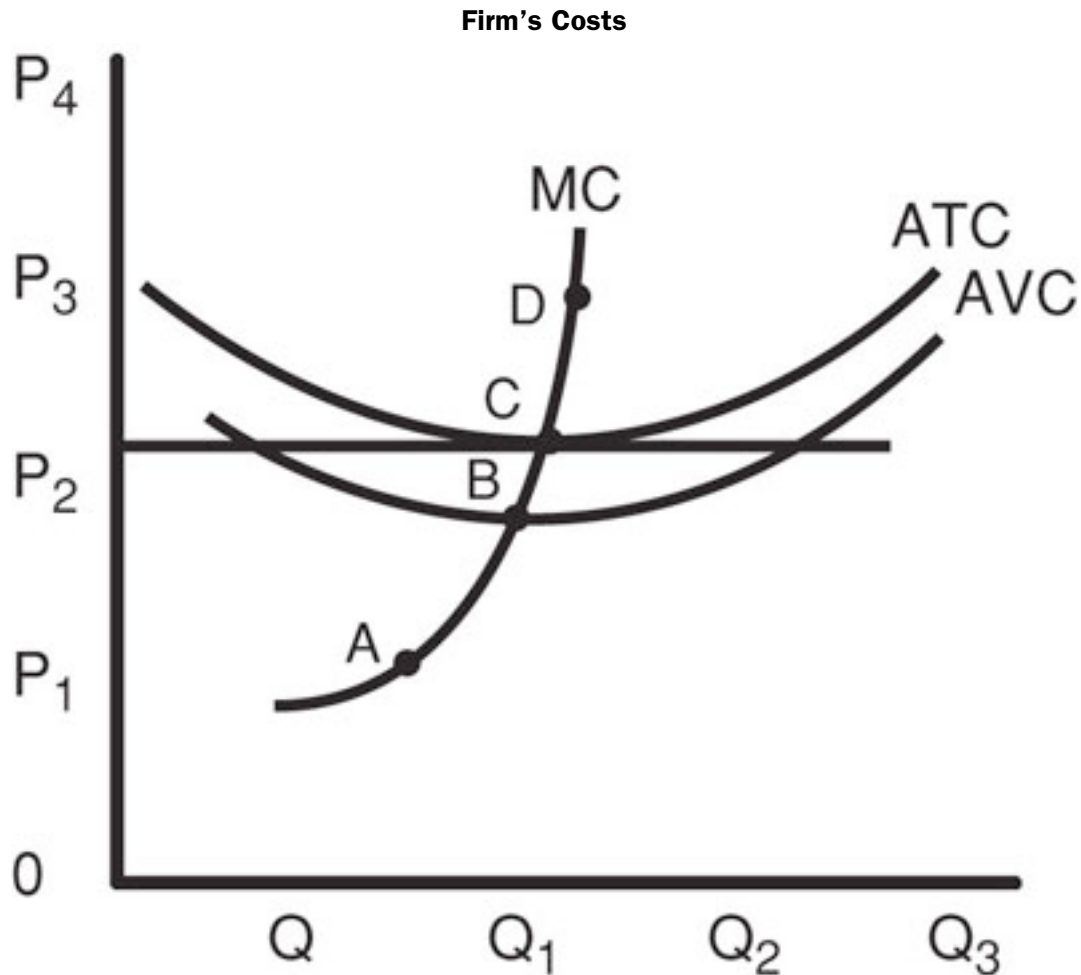
39. Refer to the preceding data. If the market price for the firm's product is \$42, the purely competitive firm will
- (A) produce 8 units at an economic profit of \$16.
 - (B) produce 5 units at a loss of \$10.40.
 - (C) produce 10 units at an economic profit of \$104.
 - (D) produce 8 units at a loss equal to the firm's total fixed cost.
 - (E) produce 7 units at an economic profit of \$41.50.
40. The short-run shutdown point for a purely competitive firm occurs
- (A) at any point where price is less than the minimum AVC.
 - (B) between the two breakeven points.
 - (C) at any point where total revenue is greater than total cost.
 - (D) at any point below normal profit.
 - (E) at any point where the firm is not making an economic profit.

Answer question 41 on the basis of the following cost data for a purely competitive seller.

Total Product Cost	Total Fixed Cost	Total Variable Cost	Total Cost
0	\$50	\$ 0	\$ 50
1	50	70	120
2	50	120	170
3	50	150	200
4	50	220	270
5	50	300	350
6	50	390	440

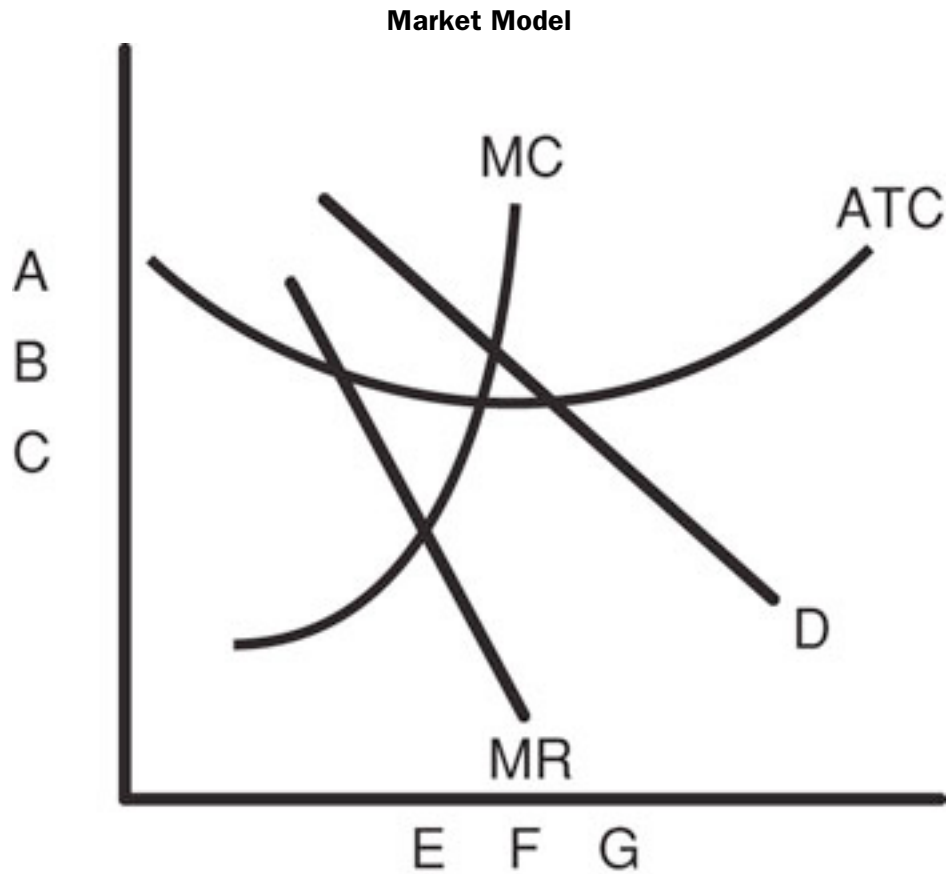
41. Refer to the preceding data. What is the marginal cost of the fifth unit of output?
- (A) \$80
 - (B) \$90
 - (C) \$50
 - (D) \$70
 - (E) \$20
42. We would expect an industry to expand if firms in that industry are
- (A) meeting explicit and implicit costs.
 - (B) earning normal profits.
 - (C) earning economic profits.
 - (D) realizing an equality of total revenue and total costs.
 - (E) earning accounting profits.
43. A firm is producing at an output where the revenue gain from the last unit produced is less than the cost of producing that additional unit. This firm is
- (A) producing more output than allocative efficiency requires.
 - (B) producing at an output that does not cover explicit costs.
 - (C) producing less output than allocative efficiency requires.
 - (D) realizing productive efficiency.

- (E) producing an inefficient output, but we cannot say whether output should be increased or decreased.



44. Refer to the preceding diagram. By producing at output level Q_1 in a purely competitive environment
- (A) the firm is operating below shutdown level.
 - (B) neither productive nor allocative efficiency is achieved.
 - (C) both productive and allocative efficiency are achieved.
 - (D) allocative efficiency is achieved, but productive efficiency is not.
 - (E) productive efficiency is achieved, but allocative efficiency is not.

45. Refer to the preceding diagram. At output level Q_2 in a purely competitive environment
- (A) the firm is operating below shutdown level.
 - (B) resources are overallocated to this product and productive efficiency is not realized.
 - (C) resources are underallocated to this product and productive efficiency is not realized.
 - (D) productive efficiency is achieved, but resources are underallocated to this product.
 - (E) productive efficiency is achieved, but resources are overallocated to this product.
46. “Public goods” refers to
- (A) any goods or services that society wants produced.
 - (B) goods whose production presumes large monopolistic corporations rather than small competitive firms.
 - (C) goods that cannot exclude consumers by price and are produced through the market system.
 - (D) goods produced at an efficient level of output due to elimination of competition.
 - (E) goods that are produced using minimal amounts of society’s scarce resources.



47. Refer to the preceding diagram. To maximize profits or minimize losses, this firm should produce
- (A) E units and charge price C.
 - (B) E units and charge price A.
 - (C) F units and charge price B.
 - (D) G units and charge price C.
 - (E) E units and charge price B.
48. An important economic problem associated with pure monopoly is that, at profit-maximizing outputs, resources are
- (A) overallocated, because price exceeds marginal cost.
 - (B) overallocated, because price is less than demand.
 - (C) overallocated, because marginal cost exceeds price.
 - (D) underallocated, because price exceeds marginal cost.

- (E) underallocated, because marginal cost exceeds price.
49. When a monopolistically competitive firm is in long-run equilibrium
- (A) production takes place where ATC is minimized.
 - (B) marginal revenue equals marginal cost and price equals average total cost.
 - (C) economic profit is above minimum ATC.
 - (D) normal profit is zero and price equals marginal cost.
 - (E) economic profit is zero and price equals marginal cost.
50. In the long run, new firms will enter a monopolistically competitive industry
- (A) provided economies of scale are being realized.
 - (B) even though losses are incurred in the short run.
 - (C) until minimum average total cost is achieved.
 - (D) as long as minimum AVC is met and shutdown is avoided.
 - (E) until economic profits are zero.
51. Cartels are difficult to maintain in the long run because
- (A) they are illegal in all industrialized countries.
 - (B) firms realize that profits would increase if they secretly increase output.
 - (C) not all members are able to attain profitable output levels.
 - (D) it is more profitable for the industry to charge a lower price and produce more output.
 - (E) entry barriers are insignificant in oligopolistic industries.
52. In the United States, professional football players earn much higher incomes than professional hockey players. This is because
- (A) most football players would be good hockey players while the reverse is not true.
 - (B) consumers have a greater demand for football games than for hockey games.
 - (C) there is a high degree of substitution of football for hockey games for most consumers.
 - (D) the total productivity of hockey players exceeds that of football players.

(E) most hockey players are foreign-born.

53. Assume the Tutta Bulla restaurant is hiring labor in an amount such that the MRC of the last worker is \$18 and the MRP is \$22. On the basis of this information, we can say that
- (A) profits will be increased by hiring additional workers.
 - (B) profits will be increased by hiring fewer workers.
 - (C) marginal revenue product must exceed average revenue product.
 - (D) Tutta Bulla is maximizing profits.
 - (E) Tutta Bulla is operating below minimum AVC.

Answer question 54 on the basis of the following marginal product data for resources A and B. The output of these resources sells in a purely competitive market at \$1 per unit.

Inputs of A	MP_A	Inputs of B	MP_B
1	25	1	40
2	20	2	36
3	15	3	32
4	10	4	24
5	5	5	20
6	2	6	16
7	1	7	8

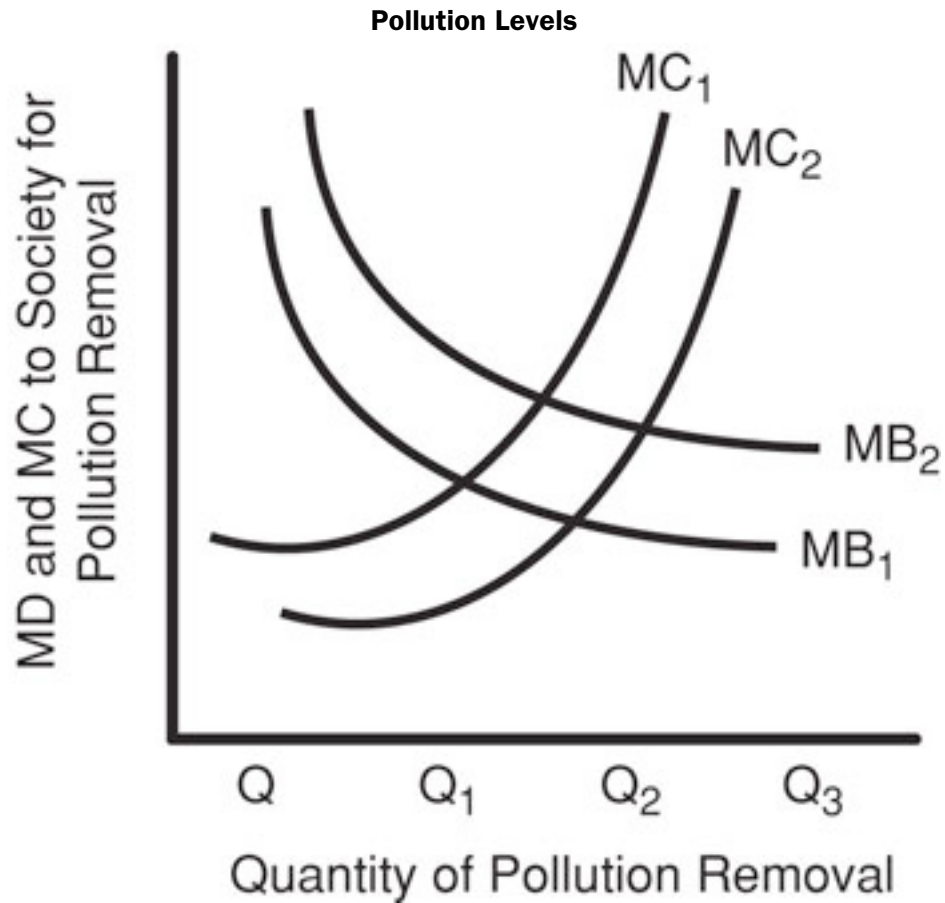
54. Refer to the preceding data. Assuming that the prices of resources A and B are \$5 and \$8 respectively, what is the profit-maximizing combination of resources?
- (A) 7 of A and 7 of B
 - (B) 6 of A and 4 of B
 - (C) 5 of A and 7 of B
 - (D) 4 of A and 4 of B

- (E) 3 of A and 5 of B

Answer question 55 on the basis of the following data.

Quantity of Labor	MP of Labor	MRP of Labor	Quantity of Capital	MP of Capital	MRP of Capital
1	15	\$45	1	8	\$24
2	12	36	2	6	18
3	9	27	3	5	15
4	6	18	4	4	12
5	3	9	5	3	9
6	1	3	6	2	6

55. Refer to the preceding data. This firm is selling its product in
- (A) an imperfectly competitive market at prices that decline as sales increase.
 - (B) a purely competitive market at \$3 per unit.
 - (C) a purely competitive market at \$2 per unit.
 - (D) a pure monopoly at \$4 per unit.
 - (E) an imperfectly competitive market at \$3 per unit.



56. Refer to the preceding diagram. Which of the following might shift the marginal benefit curve from MB₁ to MB₂?
- (A) A new government tax on pollution
 - (B) Major new studies strongly linking cancer to pollution
 - (C) Improved technology for reducing pollution
 - (D) A change in consumer tastes for manufacturing goods
 - (E) A decrease in the price of recycled goods
57. There is little incentive for a firm in a competitive environment to internalize spillover costs, as this would
- (A) cause it to forgo the diseconomies of agglomeration.
 - (B) shift its cost curves downward.
 - (C) put it at a competitive disadvantage compared to rival producers.
 - (D) make it subject to emission or effluent fees.

(E) shift its supply curve rightward.

58. In the used car market, new government regulation increasing car quality standards would

- (A) reduce the demand for, and price of, used vehicles.
- (B) give owners of “lemons” more incentive than owners of high-quality new cars to sell their cars, because buyers refuse to pay high prices for “lemons.”
- (C) increase demand for used cars, and keep their prices low.
- (D) increase the price and reduce the supply of used cars.
- (E) reduce the price of new cars, because demand would decrease.

59. With respect to the overall impact of progressive taxes and transfer payments on the distribution of income, it can be said that

- (A) taxes decrease, but transfers increase, income inequality.
- (B) taxes increase, but transfers reduce, income inequality.
- (C) both taxes and transfers decrease income inequality.
- (D) both taxes and transfers increase income inequality.
- (E) None of the above

60. Differences in education and training

- (A) combine with differences in mental, physical, and inherited assets to produce income inequality.
- (B) contribute little to income inequality in the United States.
- (C) explain nearly all the income inequality in the United States.
- (D) explain most, but not all, of the declining income inequality in the United States.
- (E) were ignored as a key element of U.S. quota and affirmative action programs.

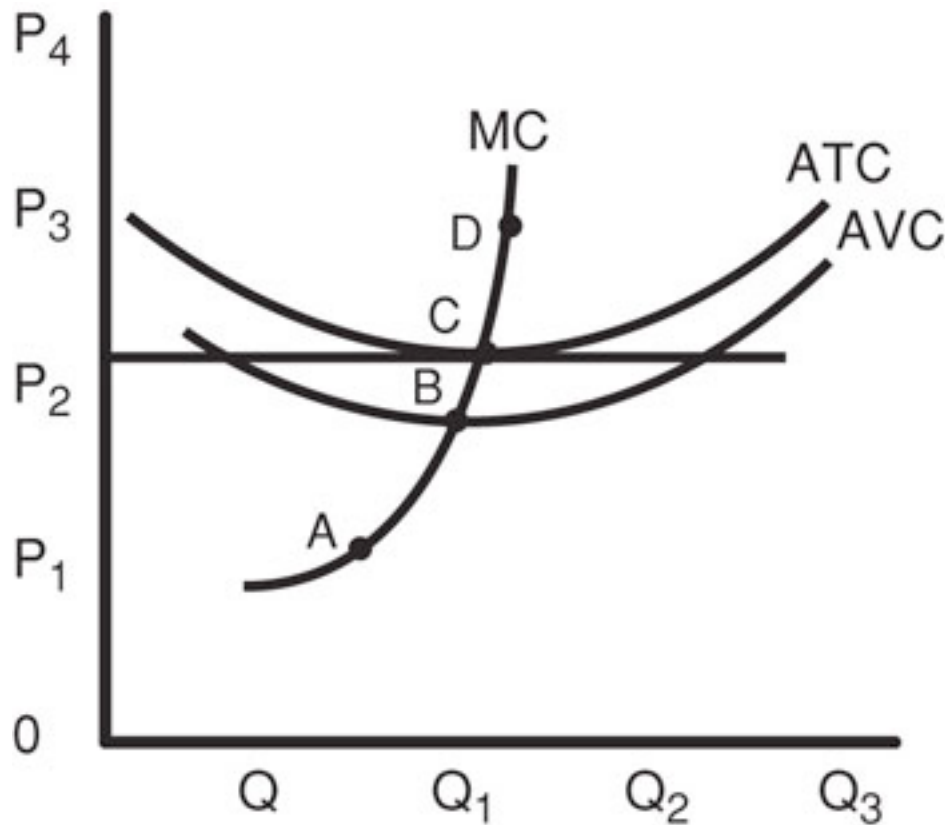
Section II

Planning Time: 10 minutes

Writing Time: 50 minutes

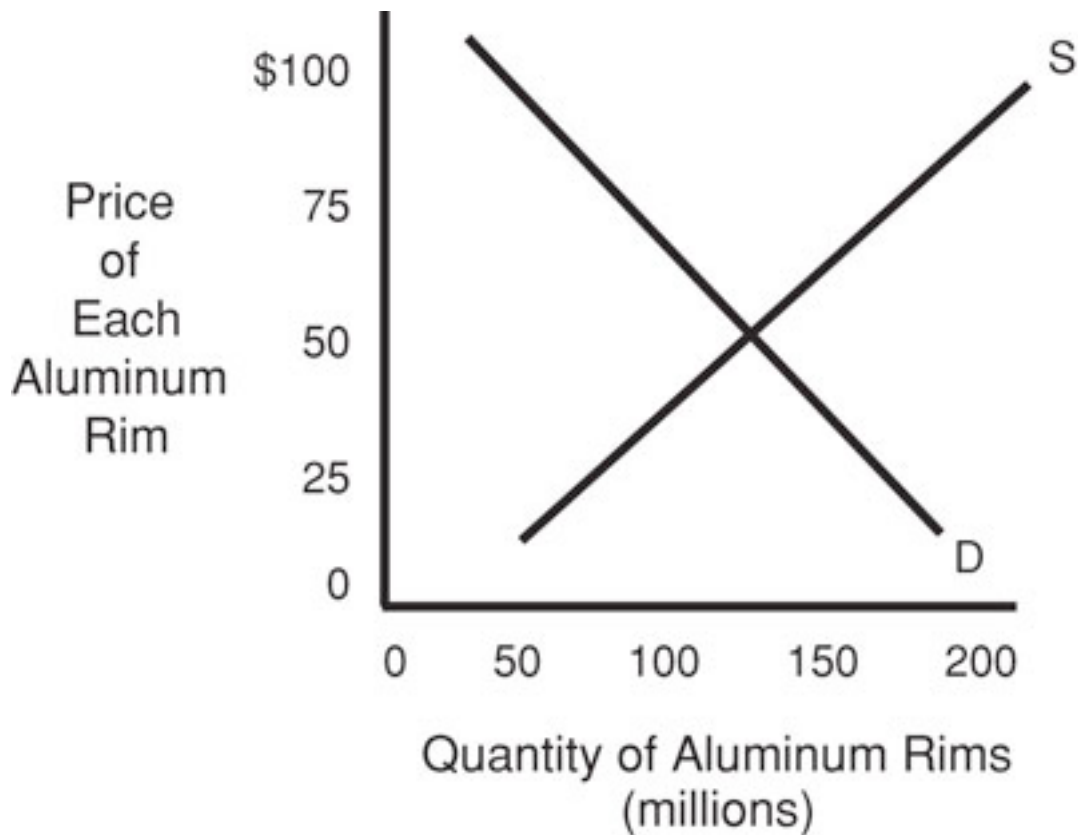
DIRECTIONS: You have 50 minutes to answer all three of the following questions. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. In answering these questions, you should emphasize the line of reasoning that generated your results; it is not enough to list the results of your analysis. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves labeled and must show directional changes.

Pure Competitive Market



1. The preceding model shows the revenue and cost curves for a purely competitive firm.
 - (a) How does the purely competitive firm determine its profit-maximizing level of output and price?
 - (b) Identify each of the following items for a purely competitive firm:

- (i) The profit-maximizing level of output and price
- (ii) The degree of elasticity of the demand for this firm's good
- (c) Where does productive efficiency occur, if at all?
- (d) Where does allocative efficiency occur, if at all?
- (e) Suppose that the industry depicted in the model above became imperfectly competitive and that the industry had an elastic, downward-sloping demand curve. Identify the new equilibrium price and quantity.
 - (i) Identify any price and quantity difference between the two types of firms.
 - (ii) Would productive and allocative efficiency be maintained?



2. During the production of aluminum rims for a new sports car, spillover costs occur in the form of air pollution.
 - (a) Congress proposes that a sales tax be levied on each aluminum rim to cover the spillover cost. Explain the effect of this tax upon the following (4 points total):
 - (i) The cost of aluminum rims
 - (ii) The price paid by consumers for sports cars with aluminum rims

- (iii) The quantity of aluminum rims produced
 - (b) Discuss the impact of this tax on the $MB = MC$ analysis of allocative efficiency. (2 points)
3. Assume that a firm produces output by employing labor and capital with the following marginal product combinations. The cost of labor is \$25 per input unit and the cost of capital is \$120 per input unit. The entire output of these independent resources sells for \$5 per unit.

Input of Labor	MP Labor	Inputs of Capital	MP Capital
1	25	1	40
2	20	2	36
3	15	3	32
4	10	4	24
5	5	5	20
6	2	6	16
7	1	7	8

- (a) Employ MRP analysis to determine the following:
 - (i) What combination of labor and capital determines maximum profit/minimum loss?
 - (ii) What output will this firm produce?
 - (iii) Determine this firm's short-run profit or loss.
- (b) If the cost of labor drops to \$10 per unit and capital increases to \$180 per unit, what changes, if any, will this firm make?

PRACTICE EXAM

Answer Key

1. (C)
2. (C)
3. (A)
4. (C)
5. (C)
6. (C)
7. (D)
8. (C)
9. (B)
10. (E)
11. (B)
12. (B)
13. (E)
14. (E)
15. (E)
16. (C)
17. (A)
18. (B)
19. (C)
20. (E)
21. (A)
22. (B)
23. (A)
24. (B)
25. (D)
26. (D)
27. (B)
28. (D)
29. (B)
30. (E)
31. (C)
32. (E)
33. (D)
34. (C)
35. (D)
36. (A)
37. (B)
38. (B)

- 39. (C)
- 40. (A)
- 41. (A)
- 42. (C)
- 43. (A)
- 44. (C)
- 45. (B)
- 46. (C)
- 47. (B)
- 48. (D)
- 49. (B)
- 50. (E)
- 51. (B)
- 52. (B)
- 53. (A)
- 54. (C)
- 55. (B)
- 56. (B)
- 57. (C)
- 58. (D)
- 59. (C)
- 60. (A)

EXPLANATIONS

SECTION I

1. **(C)** Microeconomics is primarily focused on the components that make up the economy. In a free market system, consumers, producers, government, and trade are the four main components.
2. **(C)** Economic efficiency is related to the average total cost of producing a good or providing a service. By extracting the maximum production from inputs, we realize minimum average total cost. This productive efficiency, when combined with allocative efficiency, contributes to the realization of the highest standard of living attainable for a society.
3. **(A)** The PPF curve is a model that demonstrates the economic reality that all inputs are not equal. It further demonstrates that we have choices in how our resources are employed in the production of alternative goods. In fact, as we exhaust our inputs they diminish in their productive capability, reducing at some point our total productivity, thereby raising our costs.
4. **(C)** As discussed in question 3, opportunity cost is the realization that scarcity causes us to make economic choices in how our limited resources are employed in production of alternative goods. As we choose to make one good, we sacrifice the value of the alternative choice.
5. **(C)** Box C represents the producer of goods and services that are brought (4) to product market D, and offered for sale to household A.
6. **(C)** Critical to the effectiveness of markets is that sellers of similar goods or service (g/s) are in competition for consumer expenditures. *Substitution* is the word employed by economists to describe the market reality that consumers are willing to replace a g/s whose price has increased with a like g/s.
7. **(D)** This is predicated upon the cross-elasticity formula. This formula states that as the price of a g/s decreases and the consumption of another g/s increases a degree of complement exists. Some students are tempted to conclude that C is a correct answer, but income change is not present and is necessary to conclude whether a g/s is inferior or normal/superior.
8. **(C)** A basic principle of demand is that price change causes a change in quantity demanded. Price up, Q_d down. Price down, Q_d up. The determinants of demand cause a shift in the demand curve. Be wary of this simple but effective trap!
9. **(B)** An increase in the costs of production inputs is a determinant of supply that causes the supply curve to move up and inward, representing higher overall prices. As prices rise, consumers will seek a substitute g/s. Since wine can be substituted for beer and its price has remained constant, consumers will shift some of their expenditure to wine.

10. **(E)** The equilibrium (market) price is the intersection point of the supply and demand curves. Trace the equilibrium point to the y-axis and a price of \$2.50 is revealed. Trace the equilibrium point to the x-axis and a quantity of 250 gallons is revealed.

11. **(B)** A fundamental principle established by Adam Smith was the power of specialization, not only of individuals but nations as well. Specialization results in maximum output from resources, and contributes to economic efficiency, thus minimizing cost.

12. **(B)** This answer is based upon the least cost combination of labor and capital. We do not know the marginal product of labor and capital. All we do know is the various combinations of labor and capital that together yield 30 units of output, and the cost of each unit resource. So, by establishing the cost of the four various techniques, we can determine which is the least costly and when subtracted from our total revenue, $(30 \times 0.50 =)$ \$15, yields the highest profit. The following shows the outcomes of the four techniques:

Technique I, 4 labor (\$8) + 2 capital (\$6) =
\$14 and a profit of \$1.

Technique II, 3 labor (\$6) + 3 capital (\$9) =
\$15 and 0 profit.

Technique III, 2 labor (\$4) + 5 capital (\$15) =
\$19 and a \$4 loss.

Technique IV, 5 labor (\$10) + 1 capital (\$3) =
\$13 and \$2 economic profit.

13. **(E)** This answer combines cross-elasticity of income, consumer behavior and its impact on market forces, and the reaction of firms to profit. If consumer income increases, the demand for normal goods would increase. The resultant shift in demand would cause an increase in equilibrium price and quantity. The higher price and quantity would attract firms to the opportunity to obtain profit.

14. **(E)** Public goods (like a park or defense) are defined as g/s that are not divisible and are subject to free riders. Since division of the g/s is difficult, if not impossible, the incentive of profit is not present. Therefore, even though the demand for the g/s is clearly present, it would not be produced in a free market, as profit is not present and allocative efficiency cannot be determined.

15. **(E)** The simple price elasticity test determines the percentage of change in quantity demanded (0.20) divided by the percentage of change in price (0.10). If the quotient (2) is greater than 1, the demand is considered elastic. If the quotient is less than 1, it is classified as inelastic. This measurement tells firms how price-sensitive consumers are. The total revenue test would work as well; if total revenue goes up, the demand is elastic, and if the total revenue decreases, the demand is inelastic.

16. **(C)** This answer is based upon the cross-elasticity of demand formula. If the price of X goes up (+) and the demand for Y goes down (–), a negative quotient results, indicating

a complementary relationship. If a positive quotient results, the g/s are substitutes, and if there is no change, the g/s are not related.

17. **(A)** The formula for cross-elasticity of income determines the percentage of change in quantity of good X divided by the percentage of change in the income of the consumer. If the quotient is positive, then the goods are considered normal/superior as the consumer chooses to buy more (as he or she can afford more). If income rises and the consumer buys less, the good is deemed inferior, as the consumer shifts his or her consumption to a superior comparative good.

18. **(B)** Marginal utility measures the change in total utility divided by the change in quantity. In this case, there is a change in total utility from 30 to 36, a change of 6. When divided by the quantity change of 1 (2 to 3 units = 1 unit), the marginal utility quotient is 6.

19. **(C)** This question requires the formula used to determine utility maximization of income, which determines the utility per dollar gained by the purchase of different goods when constrained by an income budget. This formula seeks to find a balance in satisfaction, as consumers do, when choosing the combination of goods to purchase within their limited income. The formula is $MU_X/P_X = MU_Y/P_Y = \text{budget } \$$. So, divide the MU at each quantity by the price of that good to obtain the MU per dollar of that good. When the MU per dollar of two or more goods is equal, and the combined quantity purchased is within the budget constraint, you have utility maximization. In this case, at 4 units of X you have a per dollar MU of 3 ($24/\$8 = 3$), and at 5 units of Y you have an MU per dollar of 3 ($12/\$4 = 3$), so the utils per dollar are equal. The next step is to determine if this combination of goods is within the budget constraints. 4 units of X \times \$8 each = \$32 spent, and 5 units of Y \times \$4 each = \$20 spent, for a total of \$52. MU per dollar of X = 3, MU per dollar of Y = 3 = \$52 budget.

20. **(E)** This answer is predicated upon the utility-maximizing formula established in the previous question. As you increase the quantity purchased at a fixed price, the utility per dollar decreases. For example, if good X costs \$2 per unit, and you increase your purchasing by one unit while MU decreases from 20 to 10, your per dollar MU would also decrease from 10 ($20\text{MU}/\$2$) to 5 ($10\text{MU}/\2).

21. **(A)** Economists determine costs and profits differently than accountants do. An accountant views a firm's costs as consisting only of explicit (out-of-pocket) expenses, thus to them profit is total revenue (price \times quantity) minus fixed and variable costs. The economist, however, includes implicit costs, like the lost value of alternative uses for startup capital, as well as entrepreneurial value (normal profit). So, breakeven point for an accountant would, to an economist, occur during economic loss, and when the economist observes breakeven point (includes normal profit) the accountant would see profit.

22. **(B)** This is a simple definition question. Short run is the length of time during which at least one input is fixed (plant size). Do not confuse this with increased or decreased utilization of existing plant size (24-hour, 7-day use) or shutdown of existing plants.

23. **(A)** This is another simple definition question. Marginal product formula is the change in total output divided by the change in input.
24. **(B)** This is a definition question. Even if we assume that all worker inputs are equal, at some point the relationship between the number of workers and the fixed plant (overcrowding) would result in inefficiencies that would cause the total product to decline. This realization is critical to understanding the shape of production cost curves.
25. **(D)** This answer is based upon the formula for determining marginal product. The change in total output divided by the change in input equals the marginal product. In this case, the change from 5 inputs to 6 inputs = 1 and total product increases from 165 to 180 = 15. 15 divided by 1 = a marginal product of 15.
26. **(D)** The formula from question 25, when applied to the relationship between increasing inputs and total productivity (opportunity costs increase, input quality diminishes as it is exhausted), yields the economic reality that at some point, the inputs of production will actually decrease total productivity, causing marginal productivity to become negative.
27. **(B)** By definition, insurance is a set premium that does not vary with a fixed farm size.
28. **(D)** Variable costs are defined as those costs that change as production increases or decreases. Fixed costs do not vary as output varies within a fixed plant structure. If the fixed plant changes in the long-run production process, fixed costs can increase or decrease, but then will become fixed at new levels.
29. **(B)** By definition, marginal cost is the change in the total cost divided by the change in quantity produced.
30. **(E)** By definition, AFC is the fixed cost divided by the total quantity produced. Mathematically, this number would constantly decline to infinity but the rate of decline would increasingly diminish.
31. **(C)** By definition, $ATC = AFC + AVC$. Therefore, $ATC - AVC = AFC$. This is the graphic model of this algebraic statement.
32. **(E)** Technical advance, by definition, means an improvement in the efficiency of output, that is, you get more output from less input. Since costs are the inverse of productivity, as productivity increases, costs decrease, and A through D are all costs that would decrease if a technical advance increased productivity. Graphically, lower costs are represented by the curves moving downward towards the x-axis.
33. **(D)** By definition, fixed costs are constant, so the change in total variable cost between two different outputs would determine the change in total cost. $\text{Output} \times AVC = TVC$. At 6 units, our total variable cost is $6 \times \$73.33 = \439.98 . At 7 units of production, our

total variable costs would be $7 \times \$80.00 = \560.00 . The change in total cost caused by the increase in output from 6 to 7 units is $\$560.00 - 439.98 = \120.02 .

34. **(C)** Profit equals total revenue minus total cost, and the given mission of this firm is to produce at the maximum profit in the short run.

35. **(D)** This answer requires knowledge of the basic definitions of breakeven and normal profit. Breakeven is the quantity and price combination wherein a firm's ATC = (average) price per unit sold. To an economist, normal profit would be included in ATC as an implicit cost of doing business, as noted earlier.

36. **(A)** Marginal revenue = marginal cost is a basic tenet of all firm behavior in any environment. The assumption is that all firms seek short-run maximization of profit or minimization of loss. These profit/loss points always occur where $MR = MC$. If $MR > MC$, more profit (or less loss) could be had by increasing output. If $MR < MC$, more loss could be avoided (or profit might be obtained) by reducing output.

37. **(B)** This table verifies the $MR = MC$ rule discussed previously. At output quantity 3, we come closest to $MR = MC$, and thus maximum profit. By adding MR at each level of output, we obtain total revenue of \$48.00 with a total cost of $\$10 + 9 + 13 = \32.00 , for a profit of \$16.00. Any other output has less profit. At output quantity 4, output level TR is \$64.00 and TC is \$49.00, for a profit of \$15.00—in other words, profits are not maximized as they are at $MR = MC$.

38. **(B)** At price 2, average price per product equals average variable cost. The firm is experiencing economic loss and its fixed and implicit costs are not being covered. However, its variable costs are being covered at this revenue level. A firm can continue to operate, in the short run, as long as inputs of production (like its workers) are being paid. It can keep the doors open in the hope that other firms will exit the market. If firms exit the market, prices would rise as industry supply decreased, and breakeven would be attained. Remember, in a purely competitive market, $P = D = MR$ and is perfectly elastic for the individual firm, which is a price taker. But the entire industry does have a downward-sloping demand curve. So, as firms exit, the Industry Supply would shift left and price would rise in the industry, and to each individual firm.

39. **(C)** This question uses the $MR = MC$ formula for profit maximization. If MR is \$42, then this firm would produce at the 10 output level, where MC is \$41 ($\$42 = \41). At 10 units, Total Revenue = \$420.00 and Total Cost = $10 \times (\text{ATC}) 31.60 = \316.00 . $TR - TC = \text{profit}$, so $\$420.00 - \$316.00 = \$104$.

40. **(A)** By definition, short-run shutdown point occurs where revenue does not cover the variable cost. If the workers are not paid, they will not work. If vendors are not paid, they don't deliver production resources. This soon results in the firm going out of business.

41. **(A)** By definition, marginal cost is the change in total cost/change in output. At output 4, TC is \$270; at output 5, TC is \$350. The change is \$80/output change of 1 = $MC = \$80$.
42. **(C)** Firms are attracted to economic profit, repelled by loss, and constant if at normal profit. So an industry would expand if existing firms were enjoying economic profit. Firms would enter until the industry returned to normal profit levels.
43. **(A)** A firm attains least cost maximum profit/minimum loss, where $MR = MC$. Since this firm is producing at an output where $MR < MC$, by reducing output, it would increase MR, decrease MC, and improve its profit/loss position.
44. **(C)** In a purely competitive industry, productive efficiency (least costly) occurs where the price (which represents society's marginal benefit) quantity combination intersects minimum ATC, indicating lowest-cost production quantity. When quantity produced results in an intersection of price and marginal cost, allocative efficiency (quantity of goods most wanted by society) results. If price (MB) is greater than MC, underallocation of resources is occurring (increase production). If price (MB) is less than MC, then overallocation of resources is occurring (cut production).
45. **(B)** This firm is overproducing and overallocating resources, as Q_2 results in an ATC greater than revenue. Neither productive nor allocative efficiency is occurring; in fact, this firm has economic loss. Under these market conditions, the firm should reduce output to a Q_1 level and return to normal profit.
46. **(C)** By definition, public goods are indivisible and subject to free ridership, since price can't be used to determine use. Since profit cannot be obtained, there is no incentive to produce; at best, they would be underproduced.
47. **(B)** Firms maximize/minimize profits where $MR = MC$. $MR = MC$ at quantity E and price A. This firm will enjoy maximum economic profit at this price/demand and quantity.
48. **(D)** Pure monopolies produce a quantity that results in a price that underallocates resources, since the total revenue generated by doing this results in the highest profit margin.
49. **(B)** In long-run equilibrium, a monopolistically competitive firm can, at best, maintain normal profit, which occurs when $MR = MC$ and price equals minimum ATC. If price rose above minimum ATC, economic profit would result, and firms would be attracted to the industry. If price fell below minimum ATC, economic loss would cause firms to exit the industry until equilibrium was attained.
50. **(E)** Due to ease of entrance and exit, as well as high levels of competition present in this market model, economic profit attracts firms, and economic loss repels firms until long-run equilibrium occurs, when price/quantity equals minimum ATC.

51. **(B)** Cartels are oligopolies acting in collusion that obtain monopoly status through their use of quotas to control quantity produced. High prices and economic profits are attained as a result. By secretly cheating on their cartel partners, they obtain the higher prices and increase their share of the economic profit. This is successful only in the short run, since in the long run prices would fall due to increased output and (assumed) constant demand. As cartel members realized that members were cheating, they would return to competition and the cartel would cease to function.

52. **(B)** Wages are the result of derived demand. Assume that the supply of two goods (sports entertainment) is equal. If the demand for one sport is greater than the other, the price paid for the good would be higher. This reflects in the cost of the inputs to the producer in the labor market for football and hockey players.

53. **(A)** Comparing marginal revenue product and marginal resource cost ($MRP = MRC$) is another method of determining maximum profit (similar to the $MR = MC$ concept), this time by balancing the marginal cost of resource inputs to the marginal revenue those resources generate for the firm. In the case of Tutta Bulla, the revenue generated at this level of output, while profitable, is not maximum profit. By producing more units, the marginal cost will rise, yet profits will also grow until $MRP = MRC$.

54. **(C)** This question employs the formulas introduced in question 53. However, an additional formula has been added. In this case, it is necessary to balance the marginal productivity of two different inputs of production (labor and capital, for instance) with the marginal revenue they generate at various output levels. The formula is stated as $MPA/\text{price of A} = MPB/\text{price of B} = \text{marginal revenue product}$. Therefore, at units of A, $5 \text{ (MP)}/\$5 \text{ (5 units} \times \$1 \text{ each)} = 7 \text{ units of B } 8 \text{ (MP)}/\$8 \text{ (8 units} \times \$1 \text{ each)} = 1 = \text{MRP of 1}$.

55. **(B)** This is another method of testing your knowledge of the MRP formula, and combines it with knowledge of price structure of firms in different competitive market structures. Since $MRP \text{ of labor} = MP \text{ of labor} \times \text{price of each unit produced}$, at 1 unit of labor $MRP = 15 \times \$x = \45 . Therefore, $x = \$3$ price per unit. This quotient is the same at all output levels of labor. It is also true for the MP of capital and MRP of capital. 1 unit of capital has an MP of 8 units, so $MRP = 8 \times \$x = \24 ; $x = \$3$ price per unit. Since the price of each unit of production remains at \$3, no matter the level of output, it must be a firm in a purely competitive market. Only in the purely competitive market is price perfectly inelastic and equal to marginal revenue.

56. **(B)** Marginal benefit reflects society's overall satisfaction with a g/s at various price quantity combinations—in this case, clean air and water. Marginal cost is the cost of producing that clean air and water in those various combinations. So, as in all other free markets, equilibrium occurs when the cost of supplying clean air and water equals society's willingness to pay that price-quantity combination. A change in MB is, in essence, an increase in demand for clean air and water. Only answer (B) would stimulate an increase in the demand for clean air and water. Since the demand would increase, quantity supplied would increase, and the price paid by society would rise.

57. **(C)** A spillover cost is a cost of production not borne directly by the producer or the consumer of a g/s. Society bears that cost, as in air pollution—if a firm in a competitive industry chose to bear the cost of pollution, its profits would diminish or it would have to raise its price. Since rival firms would not lose profits or have to raise their price (consumers would substitute the cheaper g/s), they would grow in strength.

58. **(D)** Again, this question concerns the impact that government intervention, in the form of taxation or regulation, has on a firm's cost structure, and thus market equilibrium. If government required sellers of used cars to guarantee higher reliability requirements, this would increase the cost of supplying cars to the consumer. These higher overall costs would shift the supply curve up and to the left. The resultant new market equilibrium would be at a higher price, with few cars demanded and supplied.

59. **(C)** Both progressive taxes and transfer payments, by definition, collect money from higher incomes and redistribute that money to lower incomes. Especially in the case of an increasing marginal income tax (the more one earns, the greater the percentage of tax) these are income-leveling activities.

60. **(A)** Derived demand significantly determines labor prices in a free labor market. Differences in education and training make a worker more productive (MRP) and/or increasingly scarce (MRC). When a tight supply of highly skilled labor is combined with a high demand for that worker, a high price is paid. Since income is a great determinant of wealth, these factors in a free labor market would contribute to income inequality.

SECTION II

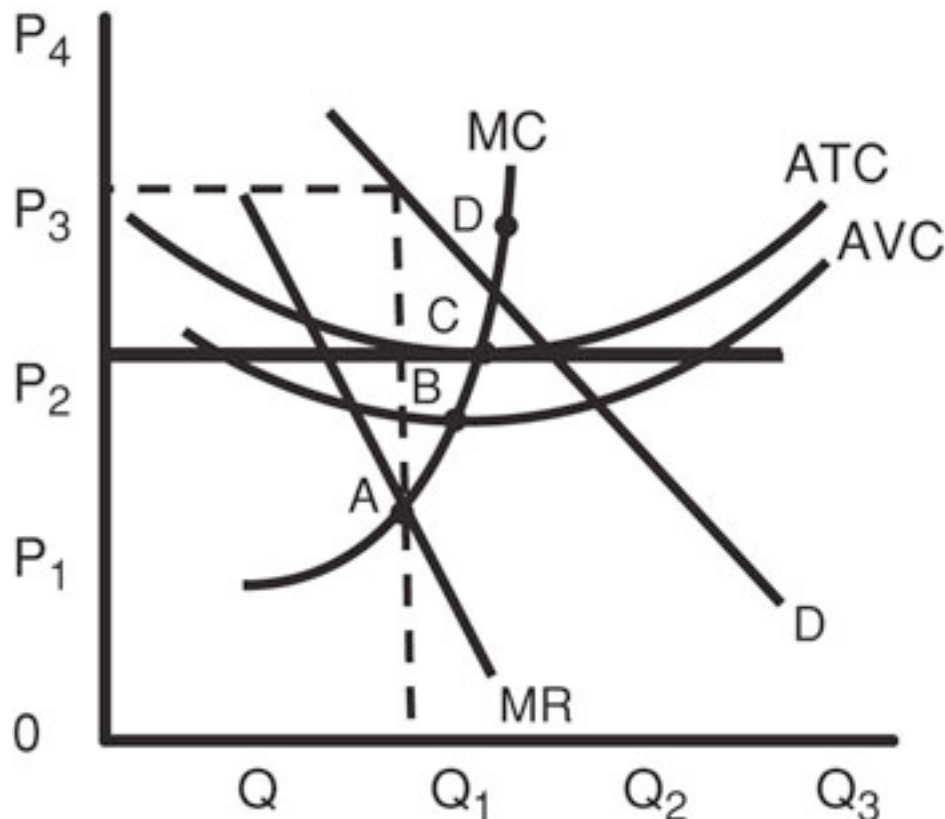
1. (a) All firms operate employing the $MR = MC$ model as the least-cost combination, maximum profit/minimum loss rule. When employing this axiom (regarding profit to a firm in a perfectly competitive environment), we must additionally realize that the firm is a “price taker”—in other words, although there is a downward-sloping demand curve for the entire industry, in a perfectly competitive market, no one firm has enough of a market share to influence the price. Since price equals both demand and marginal revenue for the firm, the best it can hope for in the long run is to operate at a point where price is equal to minimum ATC. This would represent maximum profit, which in this case would be defined as a point of normal profit. (1 point)

(b) (i) The profit-maximizing level for the purely competitive firm depicted by the given model is the equilibrium point C and P_3 price – Q_1 quantity. (1 point)

(ii) As stated in (a), for a purely competitive firm, price is perfectly elastic. The assumption is that this firm can sell all it makes at one price. This is why price = demand = marginal revenue in the perfectly competitive model. (1 point)

- (c) Productive efficiency does occur, where price intersects minimum ATC. This point, C, represents the firm maximizing its use of resource inputs (achieving the greatest output per resource input). Thus, the least cost per unit of output is expended. Any other production output quantity results in a higher cost per unit. (1 point)
- (d) Allocative efficiency is different from productive efficiency in that it does not assume least cost production, but rather the output number of goods which best benefits society. Remember that price is the consumer's communication to producers regarding the marginal benefit (utility) derived from the product. Allocative efficiency ($P = MC$) occurs when the price (marginal benefit) of a good equals its marginal cost. If price equals marginal cost at minimum ATC, then allocative efficiency would occur along with productive efficiency. Note that if price were greater than MC, the consumer would indicate to the industry that they were underallocating resources through the higher market price. Since there would be short-run profits in this industry, firms would flock to it until it returned to long-run equilibrium at normal profit. If price were less than marginal cost, the consumer would indicate to producers that the industry was overallocating resources to this good. Firms would be operating at economic loss in short-run equilibrium. The industry would adjust to these market conditions by firms exiting the industry until long-run equilibrium returned to normal profit prices. (1 point)

Imperfectly Competitive Market Model



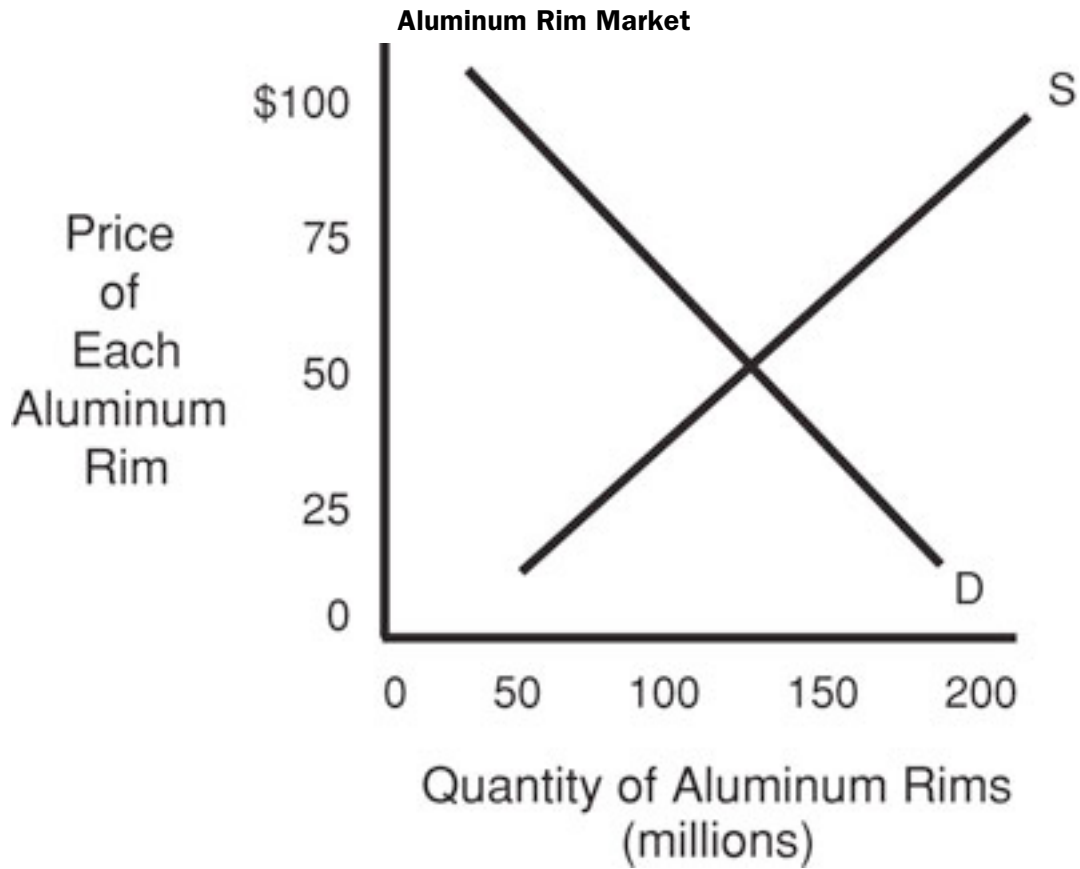
The new price and quantity equilibrium would be the result of the change to a pure monopoly. The maximum profit rule of $MR = MC$ (point A) would still apply. Notice that a monopoly is able to create a higher price (P_4) in the market by producing at a quantity below minimum ($ATC Q_1$) and far below marginal benefit to society (Q_1). Where $MR = MC$ for the pure monopoly, neither productive nor allocative efficiency is attained. This control of output (“price maker”) relative to demand allows the pure monopoly to achieve long-run economic profit. Pure monopoly is the only firm that can do this. (1 point)

- (i) Purely competitive firms (“price takers”) seek, by exit and entrance from an industry, a price (marginal revenue/quantity equilibrium) where normal profit is achieved (P_3 and Q_1 in this model).

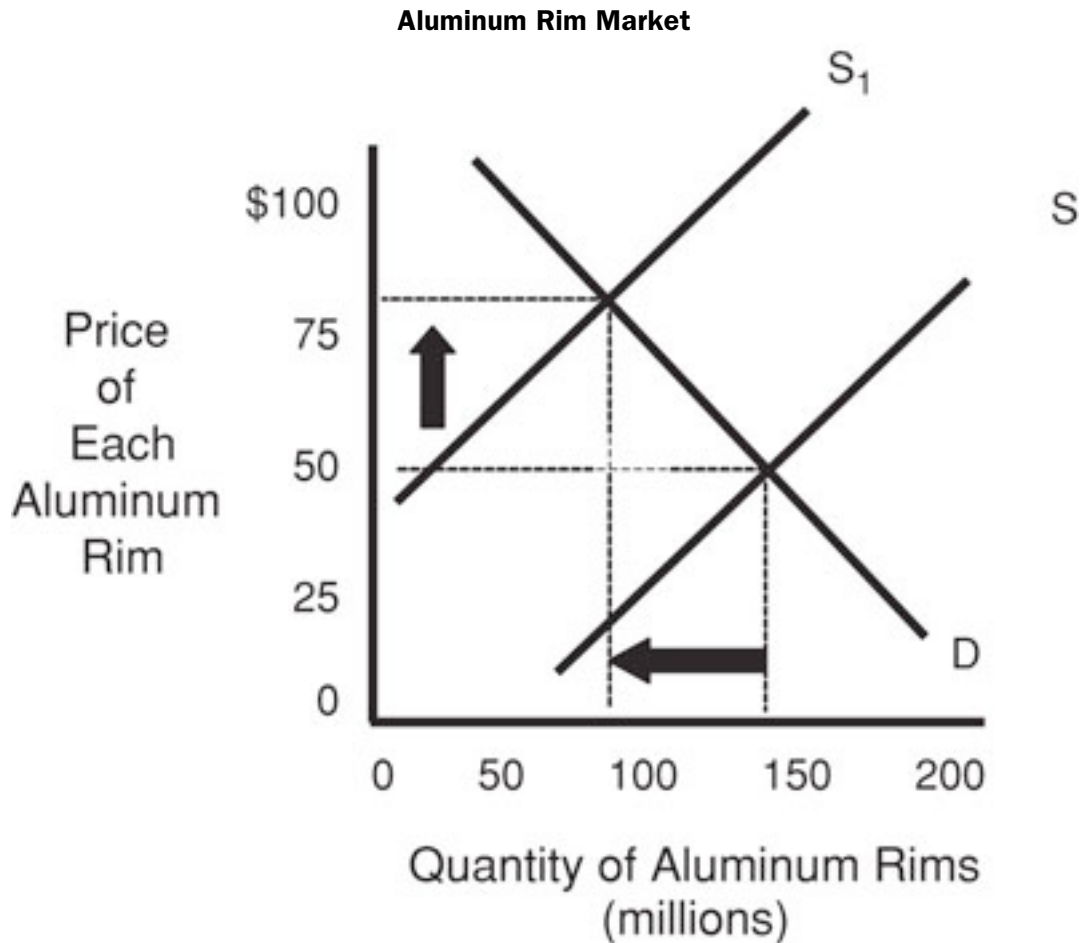
Imperfect competition seeks to employ its control (they restrict output) of market output (“price maker”) to create an equilibrium where the market is underserved, and maximum economic profit occurs. Monopolies can incur economic loss if the demand curve for their product is below the ATC curve. (1 point)

- (ii) As indicated in prior rationale, purely competitive firms can attain long-run productive and allocative efficiency. Imperfect competition manufactures economic profit by operating at prices and quantities at which neither productive nor allocative efficiency occurs. (1 point)

2. (a) The first element of a complete answer is a new graph demonstrating the changes that have taken place in the aluminum rim market. The model (1 point) should demonstrate an understanding that tax is a cost of production. An increase in tax would shift the supply (marginal cost) curve upward and to the left. This would alter the equilibrium point.



- (i) The cost of aluminum rims would increase due to the imposed tax on rims. (1 point)
- (ii) The price paid for sports cars with aluminum rims should also increase by \$100 ($\25×4 rims). However, producers might choose not to pass the additional cost of the rims on to consumers. Producers, at times, will absorb a rise in costs, depending upon their margin of profit, the impact a higher price might have upon consumers' demand, and product differentiation (degree of industry competition). (1 point)
- (iii) The quantity of aluminum rims consumed will decrease from 150 million to 100 million. Remember the law of demand: as price increases, the quantity demanded declines. (1 point)



- (b) The $MB = MC$ concept is a way to view the conflict that arises in a free market economy as we struggle with the overall societal satisfaction from a g/s relative to its cost. It is important to note that initially $MB = MC$ was resulting in allocative efficiency; however, the true cost of the aluminum rims was not reflected in the market, as air quality (market failure) was unaccounted for. The producer's supply curve understates the total cost of production. Since the price of air pollution is passed on to society as a whole, the firm enjoys lower production costs and greater profit. Once the true cost to society is factored in, society's optimal amount of air pollution reduction will occur at the new market equilibrium. Does this mean that society will rid itself of all pollution by imposing sales tax? Not at all, for air quality also has a diminishing marginal utility as well. The added benefit of ever-cleaner air will at some point be exceeded by the added cost, thereby reducing society's net well-being.

3.

Input of Labor	MP Labor	TP	Total Revenue	MR of Labor	Inputs of Capital	MP Capital	TP	Total Revenue	MRP of Capital
1	25	25	\$125	\$125	1	40	40	\$200	\$200
2	20	45	225	100	2	36	76	380	180
3	15	60	300	75	3	32	108	540	160
4	10	70	350	50	4	24	132	660	120
5	5	75	375	25	5	20	152	760	100
6	2	77	385	10	6	16	168	840	80
7	1	78	390	5	7	8	174	870	30

(a) Employing MRP analysis, it is determined:

- (i) The following formula illustrates the combination of labor and capital determining maximum profit/minimum loss:

At 5 units of labor we have $MRP\ 25/\$25 = 1$, and at 4 units of capital we have $MRP\ 120/\$120 = 1$. Therefore, our firm will maximize profits with this least-cost combination of resources.

- (ii) At 5 units of labor producing 75 outputs, and 4 units of capital producing 132, the sum ($75 + 132 = 207$ units) will be produced and sold.
- (iii) Our total revenue at this combination is $(75 \times \$5) + (132 \times \$5) = \$375 + \$660 = \$1,035$. Our total cost at this combination is $(5\text{ labor} \times \$25) + (4\text{ capital} \times \$120) = \$125 + \$480 = \$605$. The firm's profit is $\$1,035 - \$605 = \$430$.

(b) Since the price of labor declined while the cost of capital increased, a new least-cost profit-maximizing combination will arise. The firm will hire 1 more worker, for a total of 6, and reduce its capital employment from 4 units to 2 resource units. This would also alter its maximum profit. Total revenue is \$765 (labor TP 77 + capital TP 76 = an output of 153; $153 \times \$5 = \765). Total cost is \$420 ($6\text{ labor} \times \$10 = \60 and $2\text{ capital} \times \$180 = \$360$; $\$60 + \$360 = \$420$). The profit, \$345, is calculated by subtracting the total cost from the total revenue ($\$765 - \$420 = \$345$).

