

2009 AP[®] MICROECONOMICS FREE-RESPONSE QUESTIONS

MICROECONOMICS

Section II

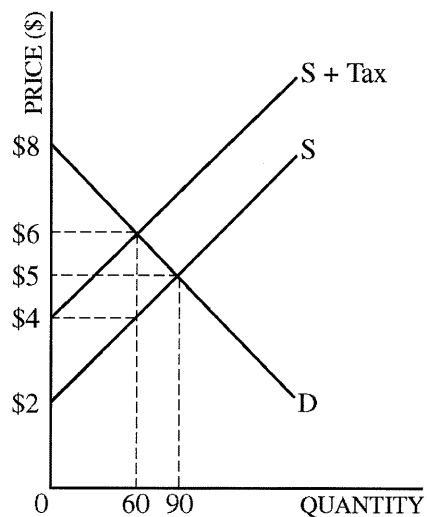
Planning time—10 minutes

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 the 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 clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. CableNow is the only supplier of cable TV services offering a wide range of TV channels. CableNow is an unregulated firm and is currently earning an economic profit. Assume that CableNow does not practice price discrimination.
 - (a) Draw a correctly labeled graph for CableNow and show each of the following. Make sure your graph is large enough to be legible.
 - (i) The profit-maximizing quantity of cable services, labeled as Q^*
 - (ii) The profit-maximizing price, labeled as P^*
 - (iii) The area of economic profit, completely shaded
 - (iv) The socially optimal level of cable services, assuming no externalities, labeled as Q_S
 - (b) Assume that the government grants CableNow a lump-sum subsidy of \$1 million. Will this policy change CableNow's profit-maximizing quantity of cable services? Explain.
 - (c) Instead of granting a subsidy, assume now that the government chooses to require CableNow to produce the quantity at which CableNow earns zero economic profit. On the graph you drew in part (a), label this quantity Q_R .
 - (d) At Q_R , is the firm's accounting profit positive, negative, or zero? Explain.
 - (e) Assume that a new study reveals there are external benefits associated with watching TV. Will the socially optimal quantity of cable services now be larger than, smaller than, or equal to the Q_S you identified in part (a)(iv) ?

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2. The graph above illustrates the market for calculators. S denotes the current supply curve, and D denotes the demand curve.
- Calculate the producer surplus before the tax.
 - Now assume a per-unit tax of \$2 is imposed whose impact is shown in the graph above.
 - Calculate the amount of tax revenue.
 - What is the after-tax price that the sellers now keep?
 - Calculate the producer surplus after the tax.
 - Is the demand price elastic, inelastic, or unit elastic between the prices of \$5 and \$6? Explain.
 - Assuming no externalities, how does the tax affect allocative efficiency? Explain.

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3. Two competing retail firms, Red Shop and Blue Mart, are studying potential locations for new stores in the suburbs of a major city. Each firm must choose between a location north of the city and a location south of the city. The payoff matrix is shown below, with the first entry in each cell indicating Red Shop's daily profit and the second entry indicating Blue Mart's daily profit. Both firms know all of the information in the payoff matrix.

		Blue Mart	
		North	South
Red Shop	North	\$900, \$1,800	\$3,000, \$3,500
	South	\$5,000, \$4,000	\$1,500, \$1,000

- (a) If Red Shop chooses a location south of the city, which location is better for Blue Mart? Explain.
- (b) Is choosing a location to the south of the city a dominant strategy for Red Shop? Explain.
- (c) If the two firms cooperate in choosing locations, where will each firm locate?
- (d) Assume that the south suburb has enacted an incentive package to attract new business. Any firm that locates south of the city will receive a subsidy of \$2,000 per day. Redraw the payoff matrix to include the subsidy.

STOP

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Writing time—50 minutes

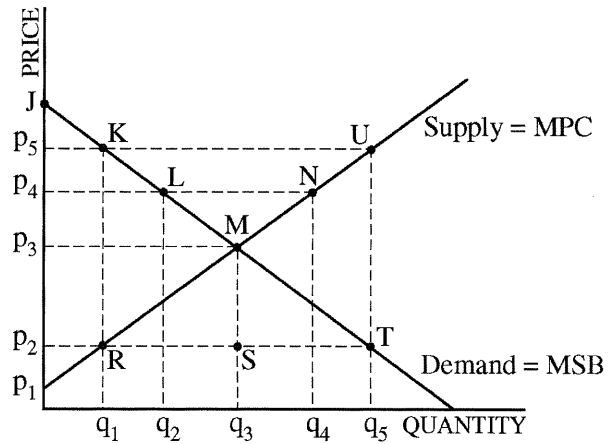
Directions: You have 50 minutes to answer all three of the following questions. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. In answering the questions, you should emphasize the line of reasoning 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 clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. Assume that corn is produced in a perfectly competitive market. Farmer Roy is a typical producer of corn.
 - (a) Assume that Farmer Roy is making zero economic profit in the short run. Draw a correctly labeled side-by-side graph for the corn market and for Farmer Roy and show each of the following.
 - (i) The equilibrium price and quantity for the corn market, labeled as P_{M1} and Q_{M1} , respectively
 - (ii) The equilibrium quantity for Farmer Roy, labeled as Q_{F1}
 - (b) For Farmer Roy's corn, is the demand perfectly elastic, perfectly inelastic, relatively elastic, relatively inelastic, or unit elastic? Explain.
 - (c) Corn can be used as an input in the production of ethanol. The demand for ethanol has significantly increased.
 - (i) Show on your graph in part (a) the effect of the increase in demand for ethanol on the market price and quantity of corn in the short run, labeling the new equilibrium price and quantity as P_{M2} and Q_{M2} , respectively.
 - (ii) Show on your graph in part (a) the effect of the increase in demand for ethanol on Farmer Roy's quantity of corn in the short run, labeling the quantity as Q_{F2} .
 - (iii) How does the average total cost for Farmer Roy at Q_{F2} compare with P_{M2} ?
 - (d) Corn is also used as an input in the production of cereal. What is the effect of the increased demand for ethanol on the equilibrium price and quantity in the cereal market in the short run? Explain.

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2. The John Lamb Company, a profit-maximizing firm producing widgets, is in a perfectly competitive widget market. Assume John Lamb employs a fixed number of employees and rents a machine for a variable number of hours from a perfectly competitive market.
- (a) Using correctly labeled side-by-side graphs of the factor market for machines and the John Lamb Company, show each of the following.
- (i) The equilibrium rental price of machines in the factor market, labeled as P_R
 - (ii) John Lamb's equilibrium rental quantity of machines, labeled as Q_L
- (b) Assume that the popularity of widgets declines, decreasing the demand for widgets. What will happen to each of the following?
- (i) Marginal product curve for machine-hours
 - (ii) Marginal revenue product curve for machine-hours. Explain.
- (c) John Lamb is employing the cost-minimizing combination of inputs. The marginal product of labor is 28 widgets per worker hour and the wage rate is \$14 per hour. The marginal product of the machine is 60 widgets per machine-hour. What is the hourly rental price of a machine?

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3. The graph above shows the perfectly competitive market for hard candies in Country Alpha. In the graph the letters correspond to points, not areas. MPC denotes marginal private cost and MSB denotes marginal social benefit.
- Using the labeling on the graph, identify the area representing each of the following at the market equilibrium.
 - The consumer surplus
 - The producer surplus
 - Assume that the production of each unit of candy creates a negative externality equal to $(p_5 - p_2)$. Using the labeling on the graph, identify the socially optimal quantity.
 - Assume that the government imposes a per-unit tax of $(p_5 - p_2)$ to correct for the negative externality. Using the labeling on the graph, identify the area representing each of the following.
 - The consumer surplus
 - The deadweight loss

STOP

END OF EXAM

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B

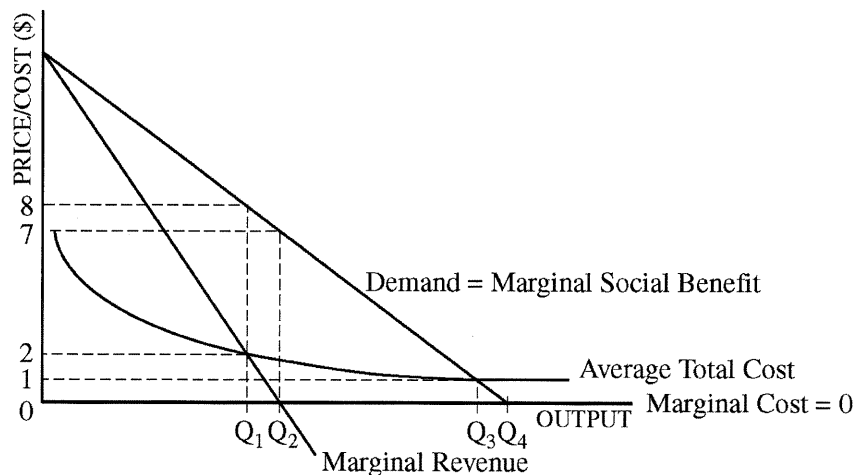
MICROECONOMICS

Section II

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1. The diagram above shows the cost and revenue curves for a bridge to a popular island. The marginal cost of crossing the bridge is zero and is indicated in the diagram as the horizontal axis. The price is the toll to cross the bridge, and the output is the number of autos that cross the bridge each day.
 - (a) Assume that a private firm owns the bridge and maximizes profits. Based on the diagram, determine each of the following.
 - (i) Output
 - (ii) Price
 - (b) Now assume that a municipality owns the bridge and sets the price to achieve allocative efficiency. Based on the diagram, determine each of the following.
 - (i) Output
 - (ii) Price
 - (c) At a price of \$1, is the municipality's accounting profit positive, negative, or zero? Explain.
 - (d) Suppose that the municipality sets a break-even price that generates revenues to just cover all economic costs.
 - (i) Based on the diagram, determine the break-even output.
 - (ii) At the output you determined in part (d)(i), is the demand relatively elastic, relatively inelastic, unit elastic, perfectly elastic, or perfectly inelastic?

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- (e) If a company begins to provide access to the island via commercial watercraft, what will happen to each of the following in the diagram?
- (i) The demand curve for bridge crossings
 - (ii) The profit-maximizing output
- (f) Suppose the long-run average total cost is strictly downward sloping. Would it be efficient to build a second bridge? Explain.
-

Number of Workers	Marginal Revenue Product per Day
1	\$450
2	\$500
3	\$450
4	\$400
5	\$300
6	\$100

2. The table above gives the short-run marginal revenue product of labor per day for a perfectly competitive firm. The firm is currently selling its product at the market price of \$5.
- (a) Calculate the marginal (physical) product of the third worker.
 - (b) Define the law of diminishing marginal returns and explain why it occurs.
 - (c) Diminishing marginal returns first occur with the hiring of which worker for the firm?
 - (d) What is the highest daily wage that the firm is willing to pay to hire the fifth worker?
 - (e) What will happen to the demand for labor if the market price of the product increases? Explain.

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3. (a) The table below gives the quantity of good X demanded and supplied at various prices.

Price (dollars)	Quantity Demanded (units)	Quantity Supplied (units)
30	1	3
20	3	3
10	4	3

- (i) Is the demand for good X relatively elastic, relatively inelastic, unit elastic, perfectly elastic, or perfectly inelastic when the price decreases from \$30 to \$20 ? Explain.
 - (ii) Is the supply of good X relatively elastic, relatively inelastic, unit elastic, perfectly elastic, or perfectly inelastic when the price decreases from \$30 to \$20 ? Explain.
 - (iii) If a per-unit tax is imposed on good X, how is the burden of the tax distributed between the buyers and sellers of good X?
- (b) Assume that the income elasticity of demand for good Y is -2 . Using a correctly labeled graph of the market for good Y, show the effect of a significant increase in income on the equilibrium price of good Y in the short run.

STOP

END OF EXAM

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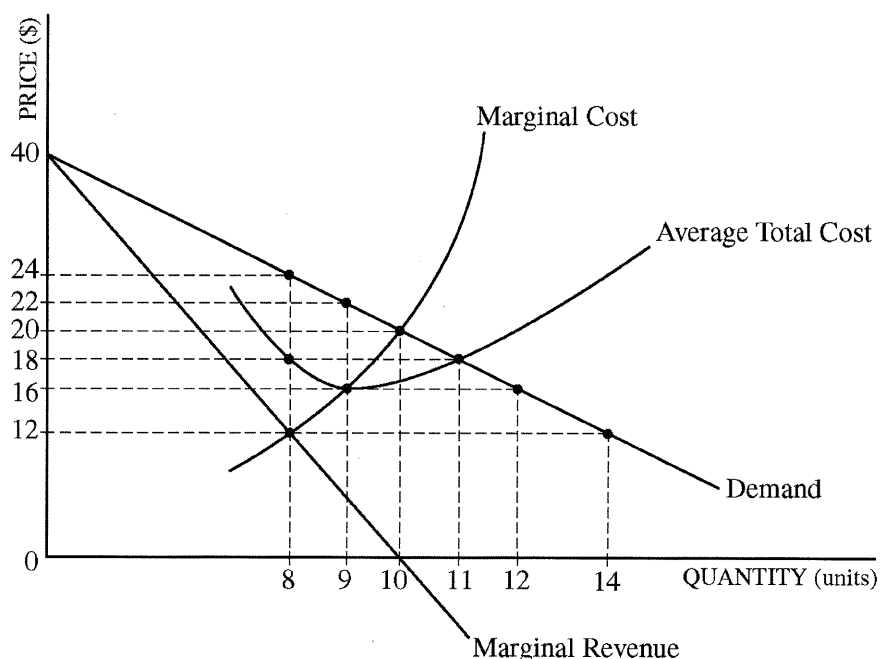
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1. A monopolist's demand, marginal revenue, and cost curves are shown in the diagram below.



- Assume that the monopolist wants to maximize profit. Using the labeling on the graph, indicate the monopolist's price.
- When the output is 8 units, what is the profit per unit?
- Assume that the monopolist is maximizing profit. Is allocative efficiency achieved? Explain.
- Between the prices of \$16 and \$18, is the monopolist in the elastic, inelastic, or unit elastic portion of its demand curve? Explain.
- Assume that regulators set an output of 11 units.
 - Is the monopolist earning positive economic profit? Explain.
 - Is the monopolist earning positive accounting profit?

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- (f) Assume instead that regulators impose a price ceiling of \$22.
 - (i) What is the marginal revenue for the eighth unit?
 - (ii) What quantity will be produced?
 - (g) Assume instead that the monopolist practices perfect price discrimination (also called first-degree price discrimination).
 - (i) What quantity will be produced?
 - (ii) What will be the value of the consumer surplus?
-

2. Assume that the market for avocados is perfectly competitive. The typical firm is earning positive economic profit in the short-run equilibrium.
- (a) Draw a correctly labeled graph for the typical firm, illustrating the short-run equilibrium and labeling the equilibrium market price and output P_E and Q_E , respectively.
 - (b) Assume there is an increase in the market wage rate for labor, a variable input. Show on your graph in part (a) the effect of the wage increase on the marginal cost curve in the short run.
 - (c) Assume that avocado producers hire workers from a perfectly competitive labor market. Draw a graph of labor supply and demand for the typical firm and label the supply curve MFC and the demand curve MRP. Assume the market wage rate increases from w_1 to w_2 . Show the effect of the wage increase on the graph, labeling the initial quantity of labor hired QL_1 and the new quantity of labor hired QL_2 .
-

3. Assume that the market for good X is perfectly competitive and that the production of good X creates a negative externality.
- (a) Draw a correctly labeled graph of the market for good X and show each of the following.
 - (i) The marginal private cost and marginal social cost of good X, labeled MPC and MSC, respectively
 - (ii) The market quantity, labeled Q_m
 - (iii) The allocatively efficient quantity, labeled Q_s
 - (iv) The area of deadweight loss, shaded completely
 - (b) Assume that a lump-sum tax is imposed on the producers of good X. What happens to the deadweight loss? Explain.

STOP

END OF EXAM

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Section II

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Writing time—50 minutes

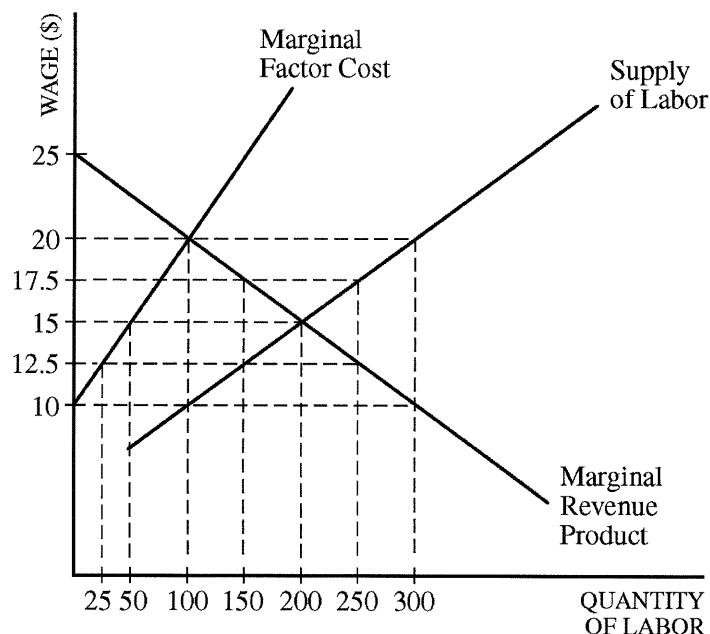
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1. Suppose that roses are produced in a perfectly competitive, increasing-cost industry in long-run equilibrium with identical firms.
 - (a) Draw correctly labeled side-by-side graphs for the rose industry and a typical firm and show each of the following.
 - (i) Industry equilibrium price and quantity, labeled P_m and Q_m , respectively
 - (ii) The firm's equilibrium price and quantity, labeled P_f and Q_f , respectively
 - (b) Is P_m larger than, smaller than, or equal to P_f ?
 - (c) Assume that there is an increase in the demand for roses. On your graphs in part (a), show each of the following.
 - (i) The new short-run industry equilibrium price and quantity, labeled P_{m2} and Q_{m2} , respectively
 - (ii) The new short-run profit-maximizing price and quantity for the typical firm, labeled P_{f2} and Q_{f2} , respectively
 - (d) As the industry adjusts to a new long-run equilibrium,
 - (i) what will happen to the number of firms in the industry? Explain.
 - (ii) will the firm's average total cost curve shift upward, shift downward, or remain unchanged?
 - (e) In the long run, compare the firm's profit-maximizing price to each of the following.
 - (i) P_f in part (a)(ii)
 - (ii) P_{f2} in part (c)(ii)

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2. Suppose research shows that the more college education individuals receive, the more responsible citizens they become and the less likely they are to commit crimes.
- (a) Draw a correctly labeled graph for the college education market and show each of the following.
- (i) Private market equilibrium quantity and price of college education, labeled Q_m and P_m , respectively
 - (ii) Socially optimal quantity of education, labeled Q_s
 - (iii) Deadweight loss at the market equilibrium, completely shaded
- (b) Assume that the government imposes an effective (binding) price ceiling on the price of college education.
- (i) Show the price ceiling on your graph in part (a), labeling the price ceiling P_c .
 - (ii) Does this price ceiling increase, decrease, or have no impact on the deadweight loss in this industry? Explain.
- (c) Assume that instead of the price ceiling, the government grants each student a subsidy for each unit of college education purchased. Will the new equilibrium quantity of college education purchased be greater than, less than, or equal to Q_m from part (a) ?

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3. Woodland is a small town in which everyone works for TreeMart, the local lumber company. TreeMart is a monopsonist in the labor market and a perfect competitor in the lumber market. In the short run, labor is the only variable input. The labor market for TreeMart is given in the graph above.
- Identify the profit-maximizing quantity of labor for TreeMart.
 - Identify the wage rate TreeMart pays to hire the profit-maximizing quantity of labor.
 - Identify the quantity of labor hired in each of the following situations.
 - TreeMart operates in a competitive labor market.
 - The government imposes a minimum wage of \$12.5. Explain.

STOP

END OF EXAM



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2014 Free-Response Questions

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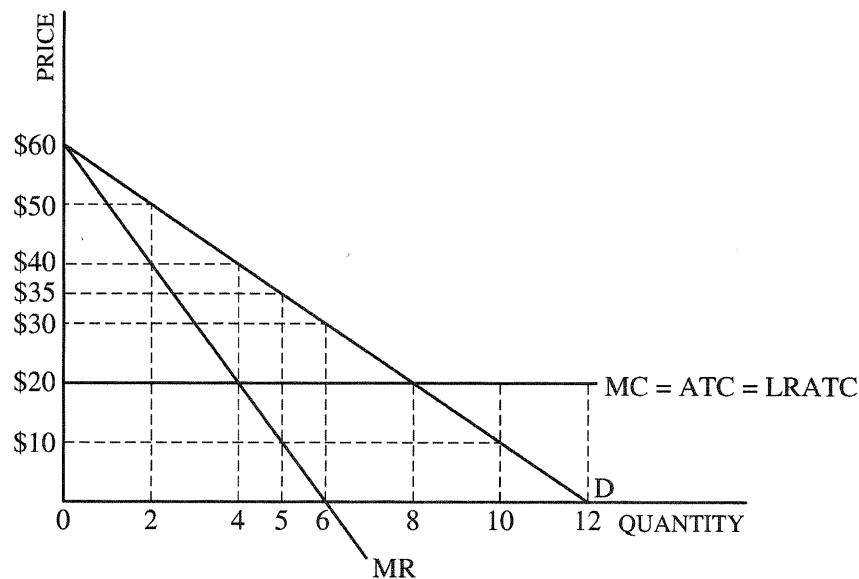
Section II

Planning time—10 minutes

Writing time—50 minutes

Directions: You have 10 minutes to read all of the questions in this booklet; to sketch graphs, to make notes, and to plan your answers. You will then 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 the 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 clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. The graph below shows the demand curve (D), marginal revenue curve (MR), marginal cost curve (MC), average total cost curve (ATC), and long-run average total cost curve (LRATC) for a monopolist.



- (a) Using the numbers given in the graph, identify each of the following for the profit-maximizing monopolist.
- (i) The quantity produced
 - (ii) The price
 - (iii) The allocatively efficient quantity
- (b) At the profit-maximizing quantity from part (a)(i), is the monopolist experiencing economies of scale? Explain.

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- (c) Now assume that the monopolist produces 10 units. Using the numbers given in the graph, calculate each of the following. Show your work.
- (i) The monopolist's economic profit
 - (ii) The consumer surplus
 - (iii) The deadweight loss
- (d) At what quantity is demand unit elastic?
- (e) Suppose the monopolist perfectly price discriminates and chooses the quantity that maximizes profit. Determine the dollar value of each of the following.
- (i) The monopolist's profit
 - (ii) The consumer surplus
-

2. Ray's Stable hires workers in a perfectly competitive factor market for unskilled labor.

- (a) Using correctly labeled side-by-side graphs for the labor market and Ray's Stable, show each of the following.
- (i) The equilibrium wage and quantity for unskilled labor, labeled W_E and Q_E , respectively
 - (ii) The wage paid by Ray's Stable and the quantity of unskilled labor hired, labeled W_R and Q_R , respectively
- (b) Is the marginal factor cost of unskilled labor for Ray's Stable greater than, less than, or equal to W_E ? Explain.
- (c) Now assume that the government imposes an effective minimum wage for unskilled labor.
- (i) Show the minimum wage on your graphs in part (a), labeled W_{MIN} .
 - (ii) On the labor market graph in part (a), show the quantity of unskilled labor supplied in the labor market as a result of the minimum wage, labeled Q_S .
 - (iii) As a result of the new minimum wage, will the marginal revenue product of the last worker hired by Ray's Stable increase, decrease, or stay the same?

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3. Assume that gasoline is sold in a competitive market in which demand is relatively inelastic and supply is relatively elastic.
- (a) Draw a correctly labeled graph of the gasoline market. On your graph show the equilibrium price and quantity of gasoline, labeled P_E and Q_E .
 - (b) Suppose the government imposes a \$2 per unit tax on the producers of gasoline. On your graph from part (a), show each of the following after the tax is imposed.
 - (i) The price paid by buyers, labeled P_B
 - (ii) The after-tax price received by sellers, labeled P_S
 - (iii) The quantity, labeled Q_T
 - (c) Using the labeling on your graph, explain how to calculate the total tax revenue collected by the government.
 - (d) Will the tax burden fall entirely on buyers, entirely on sellers, more on buyers and less on sellers, more on sellers and less on buyers, or equally on buyers and sellers? Explain.

STOP

END OF EXAM