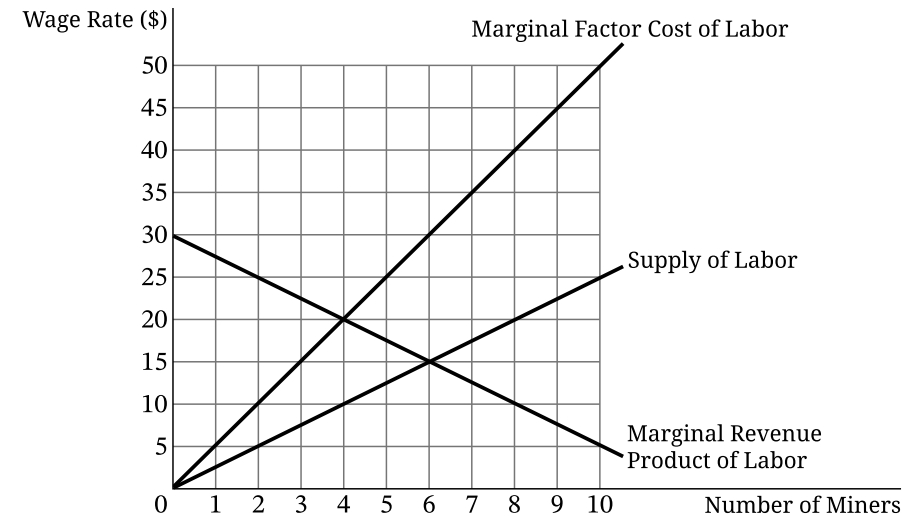


1. Voda Reservoir is a profit-maximizing firm and the only producer of bottled water in a country. Currently, Voda Reservoir is earning negative economic profit.

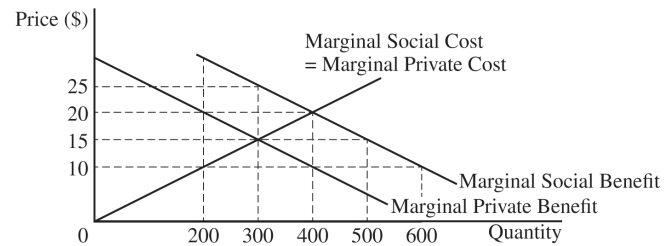
- A. Draw a correctly labeled graph for Voda Reservoir and show each of the following.
- The profit-maximizing quantity, labeled Q_M
 - The profit-maximizing price, labeled P_M
 - The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC
 - The area of deadweight loss, shaded completely
- B. Suppose the government requires Voda Reservoir to produce the socially optimal quantity of bottled water. On your graph in part A, show the socially optimal quantity of bottled water, labeled Q_S .
- C. Suppose instead the government grants a per-unit subsidy to Voda Reservoir. What will happen to Voda Reservoir's profit-maximizing quantity of bottled water? Explain.
- D. Suppose new producers have entered the bottled-water market and Voda Reservoir continues to operate in the bottled-water market. Will the demand for Voda Reservoir's bottled water become more elastic, become less elastic, or stay the same as new producers enter the market?
- E. Voda Reservoir hires workers in a perfectly competitive labor market.
- If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.
 - The government implements a new regulation that increases the minimum age required for a worker to be employed in a bottled-water factory. What will happen to the market wage in the short run? Explain.

2. Quartz Excavations is a profit-maximizing firm and the only employer of miners of quartz in a small town. The graph provided shows the labor market for miners.



- A. Identify Quartz Excavations' profit-maximizing number of miners to hire.
- B. Will Quartz Excavations pay its profit-maximizing number of miners a wage rate that is equal to \$15, greater than \$15, or less than \$15? Explain using numbers.
- C. Suppose the government sets a minimum wage (a price floor on wages) at \$25. Calculate the total wage bill for Quartz Excavations at the resulting profit-maximizing number of miners. Show your work.
- D. Suppose that instead of a minimum wage, there is now an increase in the demand for quartz.
- Will the marginal revenue product of miners increase, decrease, or remain the same? Explain.
 - After the demand for quartz increases, Quartz Excavations hires the new profit-maximizing number of miners. Will the marginal factor cost of the last miner hired be greater than, less than, or equal to the marginal factor cost of the last miner hired before the demand for quartz increased?

2. Good X is produced and sold in a perfectly competitive market. The provided graph shows the market for Good X.



- (a) Identify the market equilibrium price and quantity.
- (b) Calculate the deadweight loss at the market equilibrium. Show your work.
- (c) Suppose the government wants to eliminate the deadweight loss in the market for Good X.
- Which of the following will achieve the government's objective: a per-unit tax on consumers or a per-unit subsidy to consumers? Explain.
 - What is the dollar value of the per-unit tax or per-unit subsidy identified in part (c)(i) ?
- (d) Suppose instead the government imposes a price ceiling of \$10. Will the price ceiling achieve the socially optimal quantity of Good X? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

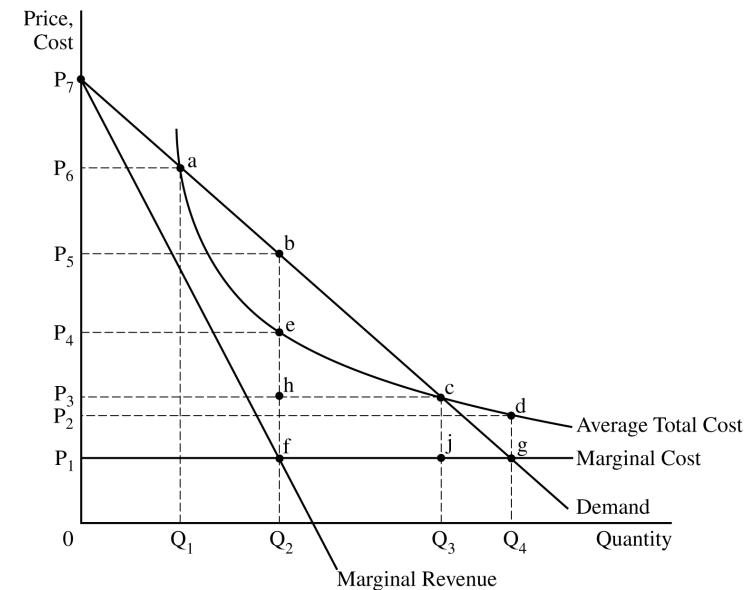
1. RKB is a profit-maximizing monopoly that produces a new, patented electronic device. RKB is earning positive economic profit.

- (a) Draw a correctly labeled graph for RKB, and show each of the following.
- The profit-maximizing quantity, labeled Q_M
 - The profit-maximizing price, labeled P_M
 - The average total cost curve consistent with RKB earning positive economic profit
 - The area representing the deadweight loss, shaded completely
- (b) The government wants RKB to produce the allocatively efficient quantity. Would the government impose a binding price ceiling, a binding price floor, a per-unit tax, or a lump-sum tax?
- (c) Suppose that the government does not impose the policy you identified in part (b). Consumers now become aware of research that confirms the use of this new device harms users' vision. Given widespread consumer awareness of this research, what will happen to RKB's profit-maximizing quantity in the short run? Explain.
- (d) Assume that RKB hires workers in a perfectly competitive labor market.
- Draw a correctly labeled graph for the labor market, showing the equilibrium wage and quantity of labor, labeled W_E and Q_E , respectively.
 - Suppose immigration increases the number of workers in this labor market. On your graph in part (d)(i), show the new equilibrium wage and quantity of labor, labeled W_2 and Q_2 , respectively.
 - RKB uses the optimal combination of capital and labor in its production process. The firm rents capital at \$500 per unit, and the last unit of capital rented has a marginal product of 2,500 units. If the marginal product of the last unit of labor hired is 1,000 units, calculate the wage rate. Show your work.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

1. Anderson Company is a typical firm that manufactures Good G in a constant-cost, perfectly competitive market. Anderson Company is currently earning positive economic profit.
- (a) What must be true about the relationship between accounting profit and economic profit if Anderson Company currently incurs both explicit and implicit costs in production?
- (b) Draw correctly labeled side-by-side graphs for the market and Anderson Company and show each of the following.
- The market equilibrium price and quantity, labeled P_M and Q_M , respectively
 - The profit-maximizing price and quantity for Anderson Company, labeled P_F and Q_F , respectively
 - The area representing Anderson Company's positive economic profit, shaded completely
- (c) On your graphs in part (b), show what will happen to each of the following if the market for Good G adjusts to long-run equilibrium.
- The market equilibrium price and quantity, labeled P_2 and Q_2 , respectively
 - Anderson Company's profit-maximizing price and quantity, labeled P^* and Q^* , respectively
- (d) Assume the production of Good G creates benefits for third parties.
- Given this situation, will the market equilibrium quantity be greater than, less than, or equal to the allocatively efficient quantity? Explain.
 - The government takes an action that corrects the externality in the market for Good G. As a result of the government's action, does total economic surplus increase, decrease, or stay the same? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.



3. The graph shows the cost and revenue curves for an unregulated, profit-maximizing monopoly.
- (a) Is the firm shown in this graph a natural monopoly? Explain.
- (b) Using the labeling from the graph, identify the area representing the deadweight loss for this profit-maximizing monopoly.
- (c) In order to improve resource allocation, the government sets a price that results in the firm earning zero economic profit.
- Using the labeling from the graph, identify the price and resulting quantity the firm would produce.
 - Will this government policy eliminate the deadweight loss? Explain using labeling from the graph.
- (d) Instead, the government decides to set a price that results in the socially optimal quantity of output. Will the firm earn positive, negative, or zero economic profit? Explain using labeling from the graph.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

STOP

END OF EXAM

1. A firm has a patent on a new carbon-capture technology, making it the only producer of that device. The firm is currently earning a positive economic profit and is producing the profit-maximizing level of output.

(a) Draw a correctly labeled graph for the firm and show each of the following.

- (i) The quantity of carbon-capture devices produced by the firm, labeled Q_M
- (ii) The price charged by the firm, labeled P_M
- (iii) The area representing consumer surplus, shaded completely

(b) The government is considering different options to regulate the firm.

- (i) Suppose the government is considering taxing the firm. Could using a per-unit tax change the firm's output to the socially optimal quantity? Explain.
- (ii) Instead, suppose the government imposes a price ceiling so that the firm produces the socially optimal quantity. On your graph in part (a), label the quantity and price after the price ceiling is imposed as Q_C and P_C .
- (iii) At the price and the quantity identified in part (b)(ii), is the firm earning positive economic profit? Explain.

(c) Assume the government decides not to regulate the firm and instead the firm produces the quantity of output that maximizes total revenue.

- (i) If the firm now increases its output by one unit, would marginal revenue be positive, negative, or zero? Explain.
- (ii) Starting at the total-revenue-maximizing quantity, if the firm reduces the price by 10%, would the quantity demanded increase by less than 10%, by more than 10%, or by exactly 10% ?

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

1. Sugar is produced in a perfectly competitive market using inputs from perfectly competitive factor markets. Frank Sugar Co. is a representative firm in the sugar market.

(a) Assume Frank Sugar Co. is earning zero economic profit. Draw correctly labeled side-by-side graphs for the sugar market and Frank Sugar Co. and show each of the following.

- (i) The market equilibrium price and quantity, labeled P_M and Q_M , respectively
- (ii) The profit-maximizing price and quantity for Frank Sugar Co., labeled P_F and Q_F , respectively

(b) Assume the demand for sugar increases and sugar is produced in a constant-cost industry.

- (i) On your graph in part (a), show the short-run effect of the increased demand for sugar on the market price, labeled P_2 , and the quantity sold by Frank Sugar Co., labeled Q_N .
- (ii) Compared to the equilibrium identified in part (a)(ii), what will happen to the short-run profit earned by Frank Sugar Co. as a result of the increased demand for sugar?
- (iii) When the market adjusts to long-run equilibrium, how will the market price of sugar in the long run compare to P_2 ? Explain.

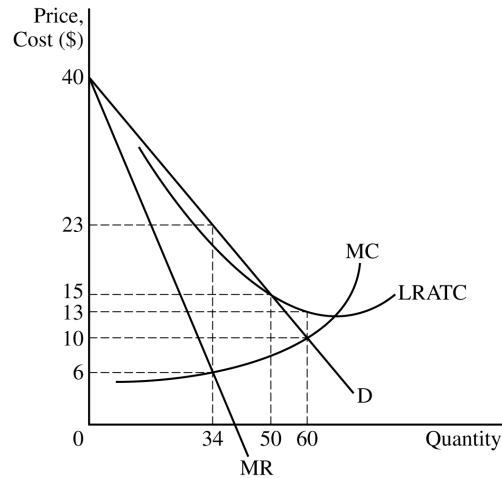
(c) Instead, assume sugar consumption has a negative impact on public health over time and the negative impact of sugar on health is underestimated by consumers. Draw a correctly labeled graph of the market, with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.

- (i) The market equilibrium quantity, labeled Q_M
- (ii) The socially optimal quantity, labeled Q_S

(d) Assume the government decides to intervene in the market to affect consumers' incentives and to address the negative impact of sugar consumption on public health. Which of the following policies would best achieve that objective in the short run: a lump-sum tax, a per-unit tax, a lump-sum subsidy, or a per-unit subsidy? Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

3. The graph provided shows the demand (D), long-run average total cost (LRATC), marginal cost (MC), and marginal revenue (MR) curves for a natural monopoly.



- (a) Over the output range of 0 to 60 units, is this firm experiencing economies of scale, diseconomies of scale, or constant returns to scale? Explain.
- (b) Using numbers from the graph, identify the price and quantity produced at which the monopolist earns zero economic profit.
- (c) Assume that regulators impose a price ceiling that results in the firm producing the socially optimal quantity in the short run.
- Calculate the total revenue at the price ceiling. Show your work.
 - Explain why the firm requires a subsidy to continue producing in the long run.
 - Calculate the lump-sum subsidy that would be required for the monopolist to produce the socially optimal quantity in the long run. Show your work.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

STOP

END OF EXAM

1. The government of an island nation grants SkyRunner Airlines exclusive monopoly rights to serve the island. SkyRunner is earning positive economic profits.
- (a) Draw a correctly labeled graph for SkyRunner, and show each of the following.
- The profit-maximizing quantity of tickets, labeled Q_M
 - The profit-maximizing price of a ticket, labeled P_M
 - The area representing profits, shaded completely

Now the island's tourist bureau asks the government to consider the following two proposals.

- Proposal I: Set a price ceiling on tickets that eliminates all deadweight loss.
- Proposal II: Eliminate SkyRunner's monopoly rights, which will remove all barriers to entry.

- (b) Suppose the government adopts proposal I. On your graph in part (a), indicate the quantity of tickets sold in the short run, labeled Q_C .
- (c) Suppose instead the government adopts proposal II. How will each of the following be affected in the long run compared to the market conditions in part (a) ?
- The quantity of tickets sold by SkyRunner. Explain.
 - The price elasticity of demand for SkyRunner's airline service. Explain.
 - SkyRunner's profits
 - The deadweight loss in the market. Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Copper is produced in a perfectly competitive market with an upward-sloping supply curve and a downward-sloping demand curve. Assume the production of copper results in liquid waste, which seeps into local rivers. The contaminated river water causes human illnesses and crop failures downstream. The marginal external cost from producing copper is constant across all quantities of copper produced.

(a) Draw a correctly labeled graph of the copper market with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.

- The market equilibrium quantity, labeled Q_M
- The socially efficient quantity, labeled Q_S

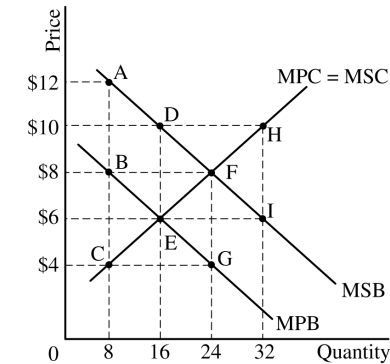
(b) Suppose the demand for copper decreases. On your graph in part (a), show the deadweight loss at the new market equilibrium, shaded completely.

(c) Suppose the government is considering levying a tax on copper.

- What per-unit tax level would achieve the socially optimal quantity?
- Explain why a lump-sum tax on producers will not achieve the socially optimal quantity in the short run.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

2. Modern-day word processing software gives consumers the ability to create and save documents in different file formats that can then be accessed by multiple computer operating systems. The graph below depicts a perfectly competitive market for word processing software. In the graph, MSB is the marginal social benefit, MPB is the marginal private benefit, MPC is the marginal private cost, and MSC is the marginal social cost.



- Identify the type of market failure illustrated by the graph. Explain.
- Using the numbers on the graph, identify the market equilibrium price and quantity.
- Using the labeling on the graph, identify the area representing the deadweight loss at the quantity identified in part (b).
- Suppose the government is considering granting a subsidy to correct the market failure. What is the dollar value of the per-unit subsidy that would achieve the socially optimal quantity?
- Suppose the government does not grant the subsidy and instead imposes a price floor at \$8.
 - How many units will consumers and producers exchange at the price floor?
 - Does the price floor correct the market failure? Explain.