

1. Feram and Ocel are the only two steel manufacturers in the region. Feram is deciding whether to transport its steel with Truck or Rail. Ocel is deciding whether to produce its steel as Sheets or Beams. The payoff matrix shows the payoffs for each combination of strategies. The first entry in each cell shows Feram’s profit, and the second entry shows Ocel’s profit. Each firm independently and simultaneously chooses its strategy. Assume that Feram and Ocel know all the information in the matrix and do not cooperate.

		Ocel	
		Sheets	Beams
Feram	Truck	\$40 million, \$95 million	\$20 million, \$125 million
	Rail	\$50 million, \$75 million	\$30 million, \$25 million

Part A

What is Feram’s most profitable strategy if Ocel chooses to produce Sheets?

Part B

Does Ocel have a dominant strategy? Explain using numbers from the payoff matrix.

Part C

Identify the Nash equilibrium (or equilibria) for this game, or state that none exists.

Part D

Suppose Feram incurs a \$20 million increase in the cost of Rail transport, with no change in the cost of Truck transport. Redraw the payoff matrix, including the firms, strategies, and payoffs, showing how the \$20 million increase in the cost of Rail transport affects the payoff matrix.

Part E

Suppose instead that Feram and Ocel now cooperate and merge into one new firm, Acier, which is now the only producer of steel in the region. Acier produces the profit-maximizing quantity of steel and is earning positive economic profit. Draw a correctly labeled graph for Acier, and show each of the following.

- i. Acier’s profit-maximizing quantity, labeled Q_1
- ii. Acier’s profit-maximizing price, labeled P_1
- iii. The average total cost curve, labeled ATC, consistent with Acier earning positive economic profit
- iv. The area of deadweight loss, shaded completely

Part F

Government regulators impose a lump-sum tax on Acier. In the short run, will Acier’s profit-maximizing price of steel increase, decrease, or remain the same as a result of the lump-sum tax? Explain.

2. The table shows Protecto’s short-run cost schedule of producing helmets.

Quantity of Helmets	Total Cost (\$)	Marginal Cost (\$)
4	200	30
5	235	35
6	275	40
7	320	45
8	375	55
9	440	65
10	520	80

Protecto produces and sells as many helmets as it wants at a market price of \$60 each, and Protecto’s fixed cost is \$80.

Part A

Identify the market structure in which Protecto sells helmets.

Part B

Calculate Protecto’s average variable cost when it produces 4 helmets. Show your work.

Part C

Calculate Protecto’s economic profit when it sells 5 helmets. Show your work.

Part D

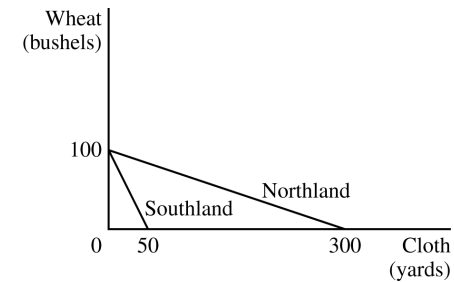
Identify Protecto’s profit-maximizing quantity of helmets. Explain your answer using marginal analysis and numbers.

Part E

Protecto is earning positive economic profit in the short run. As the market for helmets adjusts to long-run equilibrium, will the market price of helmets increase, decrease, or remain the same? Explain.

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.
 - i. The profit-maximizing quantity, labeled Q_M
 - ii. The profit-maximizing price, labeled P_M
 - iii. The average total cost curve consistent with Voda Reservoir earning negative economic profit, labeled ATC
 - iv. 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.
 - i. If the demand for bottled water increases, what will happen to Voda Reservoir's demand for labor? Explain.
 - ii. 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.

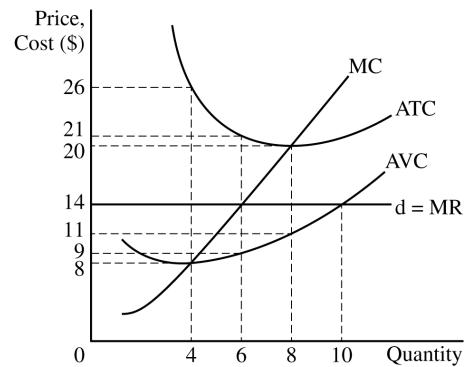
2. The graph shows the production possibilities curves for Northland and Southland.



- (a) Which country has a comparative advantage in producing wheat? Explain using numbers.
- (b) Identify a specific number of yards of cloth that could be traded for 10 bushels of wheat and would be mutually beneficial to Northland and Southland.
- (c) Southland's maximum possible output of wheat falls from 100 bushels to 75 bushels. Assuming no other changes, will Southland have a comparative advantage in producing cloth? Explain using numbers.
- (d) Turnips are produced in a perfectly competitive market in Alderia, a third country, which does not engage in international trade. Runoff from turnip fields pollutes Alderia's rivers, hurting its residents.
 - (i) Does the turnip market equilibrium result in an efficient allocation of resources? Explain using marginal analysis.
 - (ii) In an effort to reduce pollution, Alderia's government imposes a lump-sum tax on turnip production. What will be the impact on the turnip market equilibrium price and 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.

3. The graph provided shows the demand (d), marginal revenue (MR), average total cost (ATC), average variable cost (AVC), and marginal cost (MC) curves for Hansel Hangout, a typical profit-maximizing firm in a perfectly competitive market producing Good X.



- (a) Calculate Hansel Hangout's total fixed cost. Show your work.
- (b) Identify the price and Hansel Hangout's profit-maximizing quantity of Good X.
- (c) Calculate Hansel Hangout's economic profit at the quantity identified in part (b). Show your work.
- (d) As the market for Good X adjusts to the long-run equilibrium, what will happen to the price of Good X? Explain.
- (e) Assume the cross-price elasticity of demand between Good X and Good C is positive. Given the change in the long-run price of Good X in part (d), will the quantity demanded of Good C increase, decrease, or remain 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.

STOP

END OF EXAM

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.

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.

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.

- (i) The profit-maximizing quantity of tickets, labeled Q_M
- (ii) The profit-maximizing price of a ticket, labeled P_M
- (iii) 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) ?

- (i) The quantity of tickets sold by SkyRunner. Explain.
- (ii) The price elasticity of demand for SkyRunner's airline service. Explain.
- (iii) SkyRunner's profits
- (iv) 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.

MICROECONOMICS**Section II****Total Time—1 hour****Reading Period—10 minutes****Writing Period—50 minutes**

Directions: You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. 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. 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. As the only gas station in a small town, FillUp has a local monopoly on the sale of gasoline. FillUp is currently earning positive economic profit.

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

- (i) FillUp's profit-maximizing quantity, labeled Q_F
- (ii) FillUp's profit-maximizing price, labeled P_F
- (iii) The deadweight loss associated with FillUp's profit-maximizing quantity, shaded completely
- (iv) The maximum quantity at which FillUp would earn zero economic profit, labeled Q_Z

(b) Assume that FillUp's fixed costs increase because of a new lease on its property and FillUp stays in business. Will each of the following increase, decrease, or remain unchanged at FillUp's profit-maximizing quantity?

- (i) The deadweight loss. Explain.
- (ii) FillUp's economic profit

(c) Assume the demand for gasoline decreases because people bike to work more often.

- (i) What must be true for FillUp to continue to operate in the short run?
- (ii) What happens to FillUp's profit-maximizing quantity and price in the short run assuming the firm continues to operate?

MICROECONOMICS**Section II****Total Time—1 hour****Reading Period—10 minutes****Writing Period—50 minutes**

Directions: You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. 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. 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. In the early twentieth century, limited transportation options and the lack of effective substitutes gave Single Cinema monopoly power in a small town. Assume that Single Cinema is a profit-maximizing firm and currently operates at a negative economic profit in the short run.
 - (a) Draw a correctly labeled graph for Single Cinema, and show each of the following.
 - (i) The profit-maximizing price and quantity of tickets, labeled as P_m and Q_m , respectively
 - (ii) The area representing the negative economic profit, shaded completely
 - (b) Explain why Single Cinema continues to operate in the short run despite earning negative economic profit in the short run.
 - (c) Would Single Cinema's total revenue increase, decrease, or stay the same if it decides to sell one fewer ticket than Q_m ? Explain.
 - (d) Single Cinema hires workers in a perfectly competitive labor market with a downward-sloping demand curve. Suppose the number of workers available in the market decreases.
 - (i) What will happen to the wage rate? Explain.
 - (ii) What will happen to the marginal revenue product of the last worker hired? Explain.

MICROECONOMICS**Section II****Total Time—60 minutes****Reading Period—10 minutes****Writing Period—50 minutes**

Directions: You are advised to spend the first 10 minutes reading all of the questions and planning your answers. You will then have 50 minutes to answer all three of the following questions. You may begin writing your responses before the reading period is over. 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. 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. Corn is used as food and as an input in the production of ethanol, an alternative fuel. Assume corn is produced in a perfectly competitive market.
 - (a) Draw correctly labeled side-by-side graphs for the corn market and a representative corn farmer. On your graphs show each of the following.
 - (i) The equilibrium price and quantity in the corn market, labeled P_M and Q_M , respectively
 - (ii) The profit-maximizing quantity of corn produced by the representative farmer earning zero economic profit, labeled Q_F
 - (b) Assume the demand for ethanol increases. On your graphs in part (a) show what will happen to each of the following in the short run.
 - (i) The market price and quantity of corn, labeled P^* and Q^*
 - (ii) The area of the profit or loss earned by the representative corn farmer, shaded completely
 - (c) Relative to your answer in part (b), state what will happen to the market equilibrium price and quantity of corn in the long run. Explain.
 - (d) Soybeans are produced in a perfectly competitive market. Assume farmers can grow either corn or soybeans on the same land. What happens to the price of soybeans in the next planting season if the price of corn increases? Explain.
 - (e) Assume instead that the government sets a binding price ceiling in the corn market. Draw a new correctly labeled graph for the corn market and show each of the following.
 - (i) The binding price ceiling, labeled P_c
 - (ii) The quantity purchased by consumers in the corn market, labeled Q_p