

3. In Gurland, the domestic market for cucumbers is characterized by a downward-sloping demand curve and an upward-sloping supply curve, and the market for cucumbers is currently in equilibrium at a price of \$20 per bushel.

Part A

Draw a correctly labeled graph of the market for cucumbers and show the equilibrium price, labeled \$20, and the equilibrium quantity, labeled Q_1 .

Part B

Suppose that Gurland engages in free trade with other countries and that the world price of cucumbers is \$10 per bushel.

- On your graph in part A, show the world price of cucumbers, labeled \$10, and the quantity of cucumbers sold by domestic producers, labeled Q_2 .
- Will total economic surplus in Gurland increase, decrease, or remain the same after engaging in free trade?

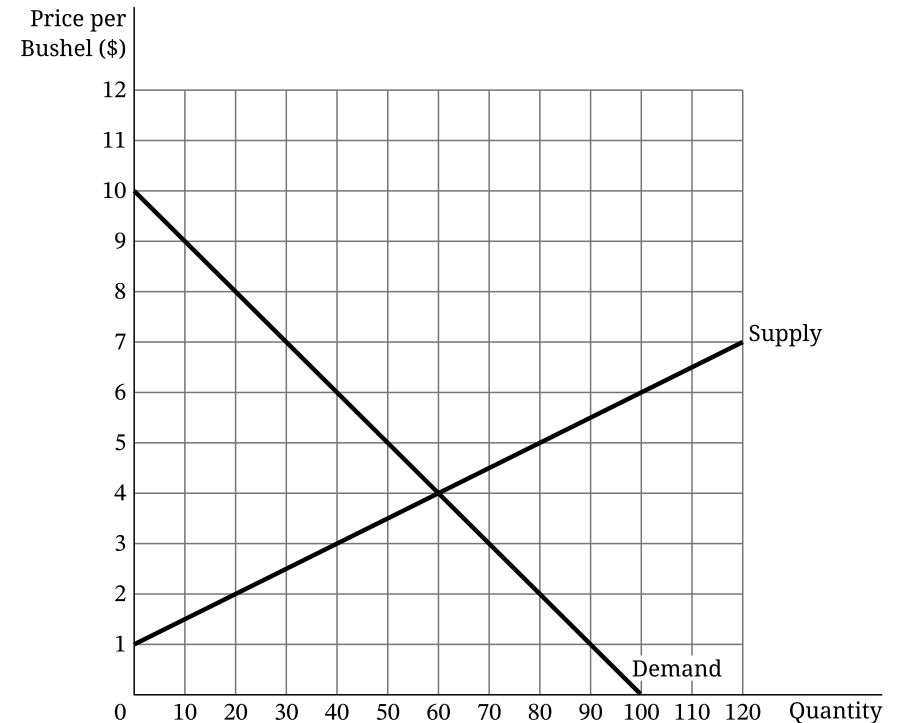
Part C

Now suppose that the government of Gurland imposes a \$5 tariff per bushel on the import of cucumbers.

- On your graph in part A, show the new quantity of cucumbers, labeled Q_3 , that will be sold by domestic producers as a result of the \$5 tariff imposed on the import of cucumbers.
- As compared with the free trade described in part B, will domestic producer surplus in the market for cucumbers increase, decrease, or remain the same as a result of the \$5 tariff imposed on the import of cucumbers? Explain.

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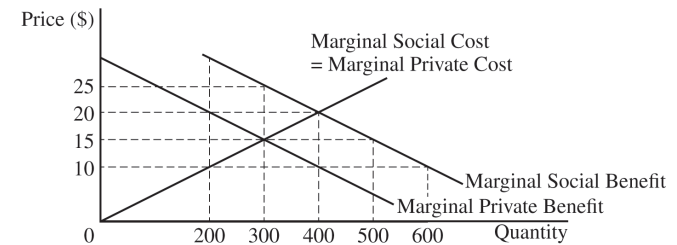
2. The graph provided shows the market for rice in the country of Rushland.



- Calculate the total economic surplus at market equilibrium. Show your work.
- If the government sets a price floor at \$3 per bushel, will there be a surplus, a shortage, or neither? Explain.
- Suppose that instead of the price floor, Rushland engages in international trade and the world price of rice is \$5 per bushel.
 - Will Rushland export or import rice? Explain using numbers from the graph.
 - Calculate the domestic consumer surplus when Rushland engages in international trade. Show your work.
 - Calculate the total revenue that Rushland's farmers will earn at the world price. Show your work.

1. Deskward is a typical profit-maximizing firm that produces and sells wooden desks in a constant-cost, perfectly competitive market that is in long-run equilibrium.
- A. Draw correctly labeled side-by-side graphs for the wooden desk market and for Deskward and show each of the following.
- The market equilibrium price and quantity, labeled P_M and Q_M , respectively
 - Deskward's profit-maximizing price and quantity, labeled P_F and Q_F , respectively
 - Deskward's average total cost curve consistent with long-run equilibrium, labeled ATC
- B. If the monthly rent, a fixed cost, on Deskward's factory building increases, what will happen to the firm's profit-maximizing quantity in the short run? Explain.
- C. Suppose the government is considering granting a per-unit subsidy to producers of wooden desks. On your market graph in part A, show the short-run effect of a per-unit subsidy on each of the following.
- The new market equilibrium price and quantity of wooden desks, labeled P^* and Q^* , respectively
 - The area representing the total cost of the subsidy to the government, shaded completely
- D. Instead of the per-unit subsidy, suppose the government imposes a binding price floor in the market for wooden desks. Will the price floor result in a shortage of wooden desks, a surplus of wooden desks, or neither? Explain.
- E. Deskward also produces chairs. Deskward increases its production from 500 chairs to 600 chairs, and its long-run total cost increases from \$80,000 to \$108,000.
- Calculate Deskward's long-run average total cost of producing 500 chairs. Show your work.
 - As Deskward increases production from 500 chairs to 600 chairs, is Deskward experiencing economies of scale, diseconomies of scale, or the efficient scale? Explain using numbers.

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



- Identify the market equilibrium price and quantity.
- Calculate the deadweight loss at the market equilibrium. Show your work.
- 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) ?
- 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. Arzeeye Pharma has a patent, a legal barrier to entry, on its newly developed eye treatment that cures common eye problems. Arzeeye Pharma is currently earning positive economic profit and is producing the profit-maximizing quantity of eye treatments.

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

- (i) The profit-maximizing quantity of eye treatments, labeled Q^*
- (ii) The profit-maximizing price, labeled P^*
- (iii) The average total cost curve consistent with positive economic profit, labeled ATC
- (iv) The area representing consumer surplus, shaded completely

(b) Suppose Arzeeye Pharma wants to charge a price that maximizes its total revenue rather than its profit.

- (i) On your graph in part (a), show the revenue-maximizing quantity, labeled Q_R .
- (ii) At quantity Q_R identified in part (b)(i), is the demand for eye treatments elastic, inelastic, or unit elastic?

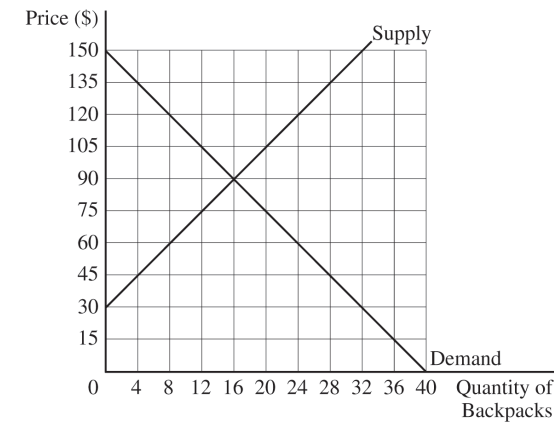
(c) Suppose now that Arzeeye Pharma engages in perfect price discrimination.

- (i) On your graph in part (a), show the lowest price that Arzeeye Pharma would charge, labeled P_2 .
- (ii) What would happen to consumer surplus? Explain.

(d) Suppose instead that Arzeeye Pharma's patent expires. Will the demand for Arzeeye Pharma's treatment become more elastic, become less elastic, or not change? 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. Backpacks are produced in a perfectly competitive market that has no externalities. The provided graph shows the market supply and demand curves for backpacks in the country of Jambo.



(a) Calculate total economic surplus at the market equilibrium. Show your work.

(b) To decrease the price of backpacks for students, the government of Jambo has decided to set a price ceiling of \$60 per backpack. Compared to the market equilibrium, will the quantity of backpacks purchased increase, decrease, or not change as a result of the price ceiling? Explain.

(c) Suppose instead the government of Jambo provides a per-unit subsidy of \$30 to the sellers of backpacks.

- (i) Identify the price paid by consumers per backpack after the per-unit subsidy is implemented.
- (ii) Calculate the total cost of the subsidy to the government. Show your work.
- (iii) Does the per-unit subsidy cause deadweight loss to increase, decrease, or remain the same compared to the market equilibrium in part (a)? 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.

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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.

3. In the local market for Good X, there are four individual buyers: Emily, Wu, Omar, and Fernanda. The quantities that each individual buyer would be willing and able to purchase at different prices are included in the table provided.

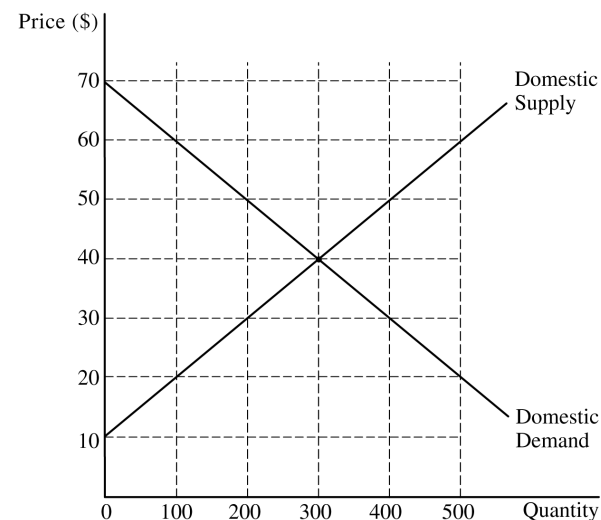
Price	Quantity of Good X			
	Emily	Wu	Omar	Fernanda
\$1	5	4	4	3
\$2	4	3	4	3
\$3	4	3	3	2
\$4	3	2	3	2
\$5	3	2	2	1
\$6	2	1	2	1
\$7	2	1	1	0
\$8	1	0	1	0

- (a) The local market for Good X has a perfectly elastic supply. Draw a correctly labeled graph for the local market for Good X with a market equilibrium price of \$5. Label the equilibrium price as \$5, and label the equilibrium quantity for the market with a specific value based on the data provided in the table.
- (b) Assume the cost of production increases, which causes the price of Good X to increase from \$5 to \$7.
- Calculate the price elasticity of demand for Good X as the price increases from \$5 to \$7. Show your work.
 - Identify whether the demand for Good X is elastic, inelastic, or unit elastic in that range of prices.
- (c) Could Emily's marginal benefit for the second unit of Good X equal \$4.50? 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.

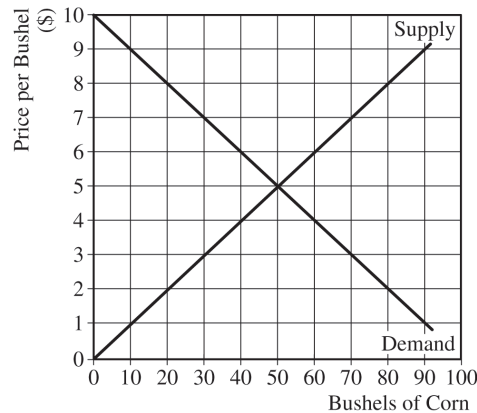
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2. The graph provided depicts New Zealand's domestic supply and demand for wool.
- Calculate the consumer surplus if New Zealand does not trade with the rest of the world. Show your work.
 - Instead, assume New Zealand decides to trade wool in the world market. The current world price of wool is \$60 per unit, and New Zealand is a price taker in the world market.
 - How many units of wool will New Zealand export?
 - What will happen to the consumer surplus of wool consumers in New Zealand when New Zealand begins to trade with the rest of the world? Explain.
 - Will total economic surplus in New Zealand increase, decrease, or remain unchanged when New Zealand begins to trade wool in the world market? Explain using numbers.
 - Now assume domestic demand in New Zealand increases. Will New Zealand's exports increase, decrease, or stay the same?

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 diagram above shows the market for corn in the country of Microland. Corn is produced and sold in a constant-cost, perfectly competitive market.

- Calculate the total revenue earned by corn farmers at the market equilibrium price. Show your work.
- In an attempt to assist corn farmers in Microland, the government sets a \$7 price floor on corn.
 - How many bushels of corn will be exchanged at the price floor?
 - Calculate the deadweight loss associated with the price floor. Show your work.
 - Assume the government agrees to buy the unsold quantity at \$7. Calculate the producer surplus. Show your work.
 - Assume the price floor and the government buying program remain in effect. In addition, assume the demand for corn does not change. In the long run, will the quantity of corn purchased by the government 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.

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END OF EXAM

2. The following is a table showing Dana's marginal benefit from purchasing bottles of water and good X from a grocery store.

Quantity of Water (in bottles)	Marginal Benefit of Water (in dollars)	Quantity of Good X (in units)	Marginal Benefit of Good X (in dollars)
1	24	1	24
2	18	2	18
3	12	3	12
4	6	4	6
5	3	5	3

- What is Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X? Show your work.
- Assume the price of a unit of good X is \$5. Calculate the total consumer surplus if Dana purchases 3 units of good X. Show your work.
- Now assume the price of a bottle of water is \$3 and the price of a unit of good X is \$6. Dana spends her entire budget of \$30 on bottles of water and good X.
 - Explain why Dana does not maximize her benefit when she purchases 2 bottles of water and 4 units of good X. Use marginal analysis to explain your answer.
 - What are the optimal quantities of good X and bottles of water at these prices?
 - Suppose the price of a unit of good X drops to \$3. Calculate Dana's cross-price elasticity of demand for bottles of water with respect to the price of good X, and state whether the two goods are substitutes or complements. Show your work.

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. The markets for bananas, muffins, and coffee are interrelated, and each market is perfectly competitive.
 - (a) In the market for bananas, the equilibrium price is \$1.00 per pound, and the equilibrium quantity is 1,000 pounds per week. Suppose the government imposes a price floor on bananas at \$1.20 per pound, causing the quantity supplied to increase to 1,500 pounds per week.
 - (i) Would the price floor result in a shortage, a surplus, or neither? Explain.
 - (ii) Calculate the price elasticity of supply if the price increases from \$1 to \$1.20. Show your work.
 - (iii) Between \$1 and \$1.20, is the supply elastic, unit elastic, or inelastic? Explain.
 - (b) Bananas are an input for muffins.
 - (i) Draw a correctly labeled graph of the market for muffins indicating the equilibrium price and quantity, labeled P_0 and Q_0 , respectively.
 - (ii) On the graph drawn in part (b)(i), show the impact of an increase in the price of bananas on the muffin market, labeling the new equilibrium price and quantity P_1 and Q_1 , respectively.
 - (iii) On the same graph, completely shade the area that represents the **change** in the consumer surplus caused by the increase in the price of bananas.
 - (c) In the market for coffee, the equilibrium price is \$3.00 per cup and the equilibrium quantity is 100 cups per week. The cross-price elasticity of coffee with respect to muffins is -2 .
 - (i) Are coffee and muffins normal goods, inferior goods, complementary goods, or substitute goods?
 - (ii) Assume the supply of coffee is perfectly elastic. Using the equilibrium price and quantity given above, draw a correctly labeled graph for the coffee market, and show the impact of an increase in the price of muffins on the coffee market.
 - (iii) Given the original quantity of 100 cups of coffee per week, if the increase in the price of muffins is 10%, calculate the new equilibrium quantity in the coffee market. Show your work.