

EXAMINATION 4 VERSION A
"Perfect and Imperfect Competition"
November 20, 2019

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators, calculators with alphabetical keyboards, wireless devices and mobile phones are NOT permitted. Numerical answers, if rounded, must be correct to at least 3 significant digits. Point values for each question are noted in brackets. Maximum total points are 100.

I. Multiple choice: Please circle the one best answer to each question. [1 pt each, 8 pts total]

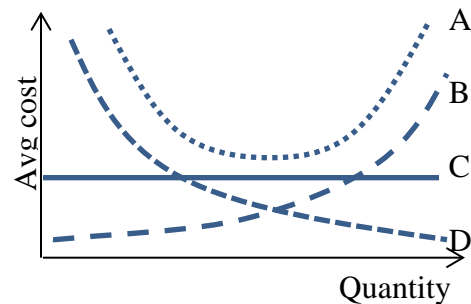
- (1) Suppose the paper industry is perfectly competitive and the price of a ream of paper is \$5. Then any firm in the paper industry believes its marginal revenue is
- more than \$5.
 - less than \$5.
 - exactly equal to \$5.
 - zero.

- (2) Suppose that the bread industry is producing 3 million loaves of bread per month for some reason, and that at this level of output, the marginal benefit to consumers of a loaf of bread is \$3, but the marginal cost of producing a loaf of bread is only \$2. Society would be better off if
- fewer loaves of bread were produced.
 - more loaves of bread were produced.
 - None of the above.
 - Cannot be determined from information given.

- (3) Efficiency in consumption requires that all consumers
- have the same budget lines.
 - have equal marginal rates of substitution.
 - have equal incomes.
 - choose identical combinations, or bundles, of goods.
 - All of the above.

- (4) Suppose the price of a pair of jeans is \$30 and the price of a teshirt is \$5. If the economy is perfectly competitive, then these prices indicate that the *economy's* opportunity cost of a pair of jeans is
- 1/5 of a teshirt.
 - 1/6 of a teshirt.
 - 1 teshirt.
 - 5 teshirts.
 - 6 teshirts.

- (5) Which average cost curve below implies that the firm enjoys a natural monopoly?



- Curve A.
- Curve B.
- Curve C.
- Curve D.
- None of the above.

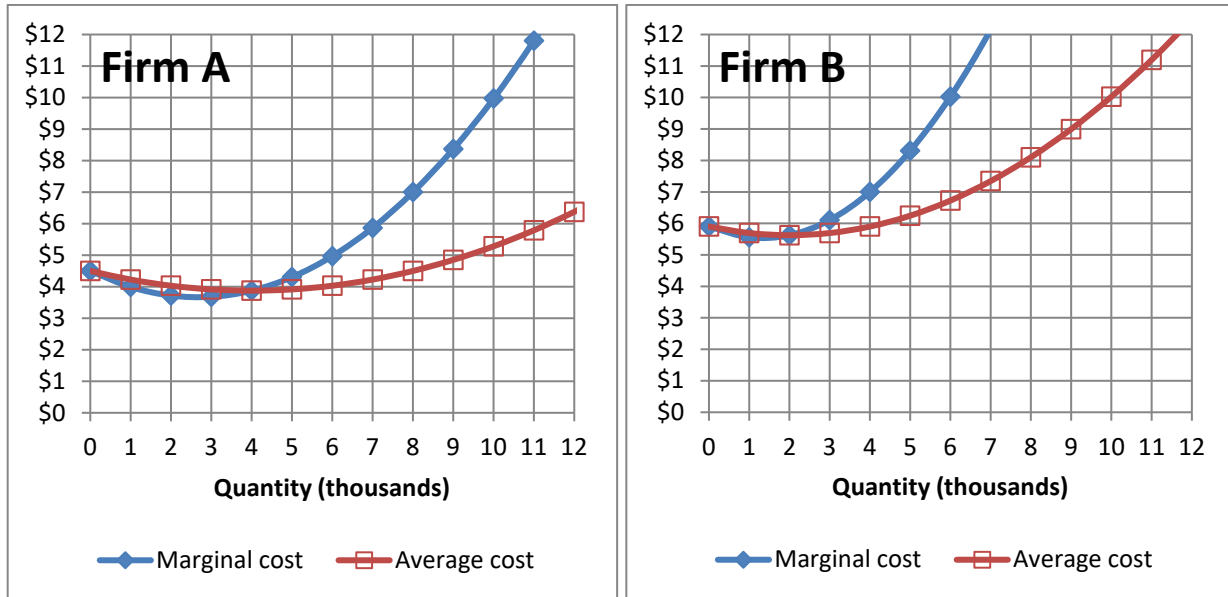
- (6) Suppose a sandwich stand sells 10 sandwiches per hour if the price is \$5, and sells 11 sandwiches if the price is lowered to \$4.75. The stand's marginal revenue of the 11th sandwich is therefore
- \$0.25 .
 - \$2.25 .
 - \$2.50 .
 - \$4.75 .
 - \$5.00 .
 - \$10.00 .

- (7) Cartels are organizations of firms that try to increase their members' profits by
- boosting output.
 - increasing advertising.
 - offering discounts and promotional pricing.
 - reducing output.
 - sharing technology.

- (8) Products are said to be "differentiated" if
- a. one can buy them in fractional amounts.
 - b. consumers do not view them as perfect substitutes.
 - c. they are sold through different retail channels (stores, online, catalogs, etc.)
 - d. different consumers buy different quantities of them.

II. Problems: Insert your answer to each question in the box provided. Use margins and graphs for scratch work. Only the answers in the boxes will be graded. Work carefully—partial credit is not normally given for questions in this section.

(1) [Economy-wide efficiency: 12 pts] Suppose there are two firms in the industry producing snow shovels, with the marginal cost curves and average cost curves shown in the graph below.



- a. Suppose Firm A is currently producing 6 thousand snow shovels. If Firm A increases production by one snow shovel, by how much will its total cost increase? (Give an answer to the nearest whole dollar.)
- b. Suppose Firm B is currently producing 6 thousand snow shovels. If Firm B increases production by one snow shovel, by how much will its total cost increase? (Give an answer to the nearest whole dollar.)

	\$
	\$

First assume the firms' output levels must be set by a government planner. The planner wants the firms to produce a total of 12 thousand snow shovels, but total industry cost (that is, the combined costs for both firms) must be as low as possible.

- c. Which firm should be instructed to produce more output—Firm A or Firm B, or should they produce an equal amount of output to make total industry cost as low as possible?
- d. How much output should Firm A produce?
- e. How much output should Firm B produce?

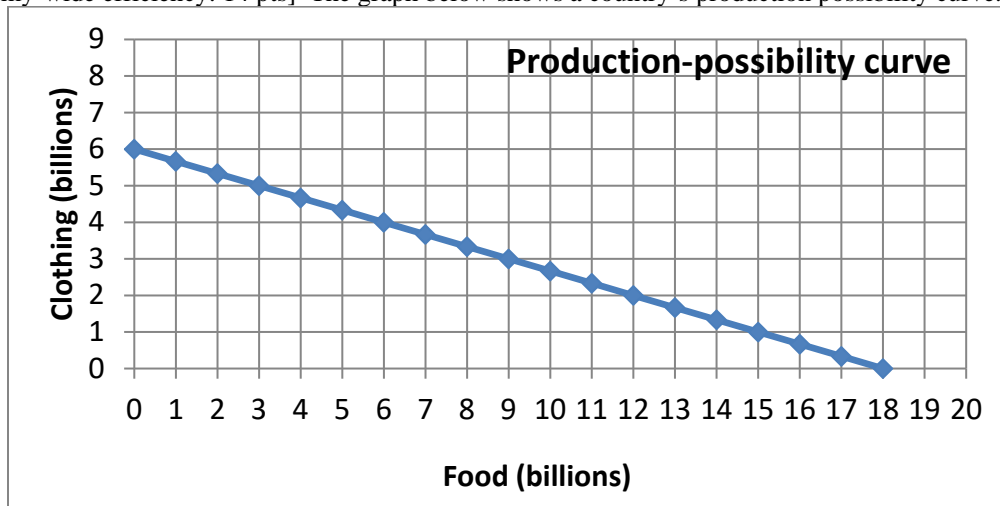
	thousand
	thousand

Alternatively assume there is no government planner. Assume instead that the two firms are competitive and that they each maximize their own profit while taking price as given.

- f. What price for snow shovels will motivate the two firms to produce a total of 12 thousand snow shovels at lowest total industry cost?

	\$
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(2) [Economy-wide efficiency: 14 pts] The graph below shows a country's production possibility curve.



- a. What is this **country's** opportunity cost of a unit of food?
- b. What is this **country's** opportunity cost of a unit of clothing?

units of clothing
units of food

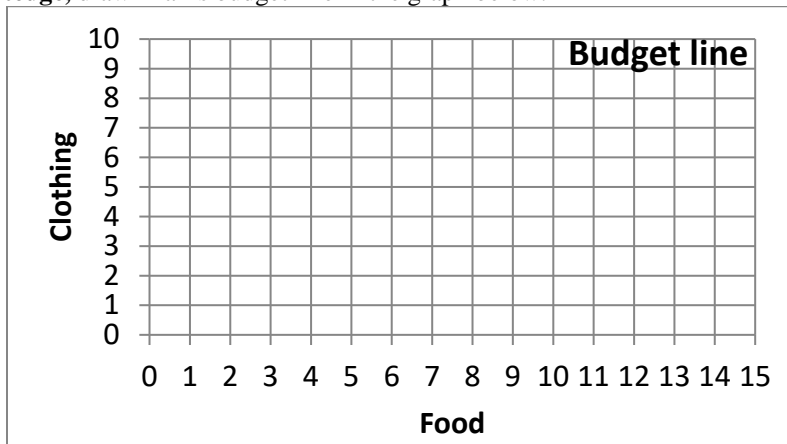
Assume this country's economy is in competitive equilibrium in all markets and the price of a unit of clothing is \$6.

- c. What must be the price of a unit of food?

\$

Alan is a consumer in this economy. He has an income of \$30.

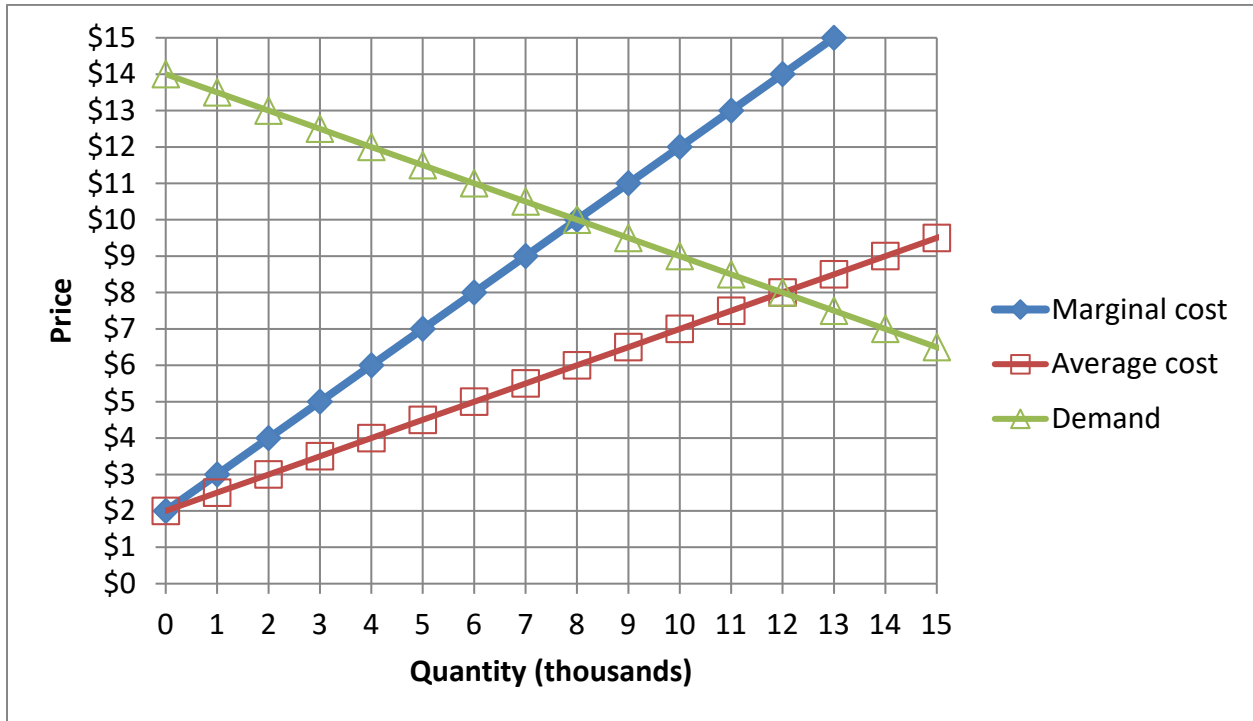
- d. Using a **straightedge**, draw Alan's budget line in the graph below.



- e. What is **Alan's** opportunity cost of a unit of food?
- f. What is **Alan's** opportunity cost of a unit of clothing?
- g. Sketch an indifference curve tangent to Alan's budget line. What is the slope of that indifference curve (that is, Alan's marginal rate of substitution) at the tangency point?

units of clothing
units of food

(3) [Monopoly, price discrimination: 22 pts] Snowhill is the only ski slope in its region, so it enjoys monopoly power. The graph below shows Snowhill's monthly demand, marginal cost, and average cost curves.



First, suppose Snowhill must charge the same admission price to everyone.

- Using a straightedge, draw and label Snowhill's marginal revenue curve.
- Compute Snowhill's profit-maximizing quantity.
- Compute the price that Snowhill would charge.
- Compute Snowhill's profit.
- Compute consumer surplus
- Compute the social deadweight loss from this pricing scheme.

	thousand
\$	
\$	thousand
\$	thousand
\$	thousand

Second, suppose Snowhill can somehow charge a different admission price to each person, equal to the maximum price that person is willing to pay. In other words, suppose *perfect price discrimination* is possible.

- Compute Snowhill's profit-maximizing quantity.
- Compute Snowhill's revenue.
- Compute Snowhill's profit.
- Compute consumer surplus.
- Compute the social deadweight loss from this pricing scheme.

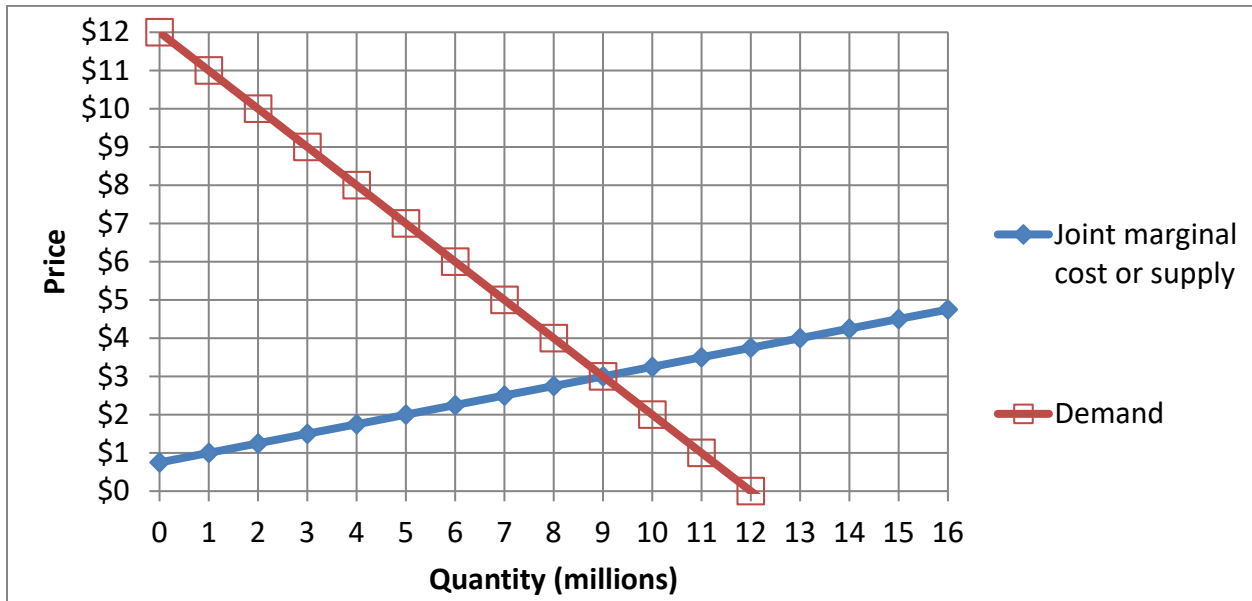
	thousand
\$	thousand
\$	thousand
\$	thousand
\$	thousand

(4) [Monopoly price discrimination: 4 pts] Suppose the only movie theatre in town sells tickets to both children and adults. The theatre believes the elasticity of demand by children is -5 , and the elasticity of demand by adults is -3 . Assume the theatre's marginal cost of a ticket is \$8.

- a. Compute the profit-maximizing ticket price for children.
- b. Compute the profit-maximizing ticket price for adults.

	\$
	\$

(5) [Competition versus collusion: 16 pts] Suppose a small group of firms produce a certain vitamin. The graph below shows the demand curve for the vitamin, and the joint marginal cost or supply curve of the group of firms.



First, assume the firms *compete* with each other, each maximizing its own profit while taking the market price as given.

- a. What will be the equilibrium market quantity?
- b. If output increased by one more unit at any firm, total costs would increase by how much?
- c. What will be the equilibrium market price?

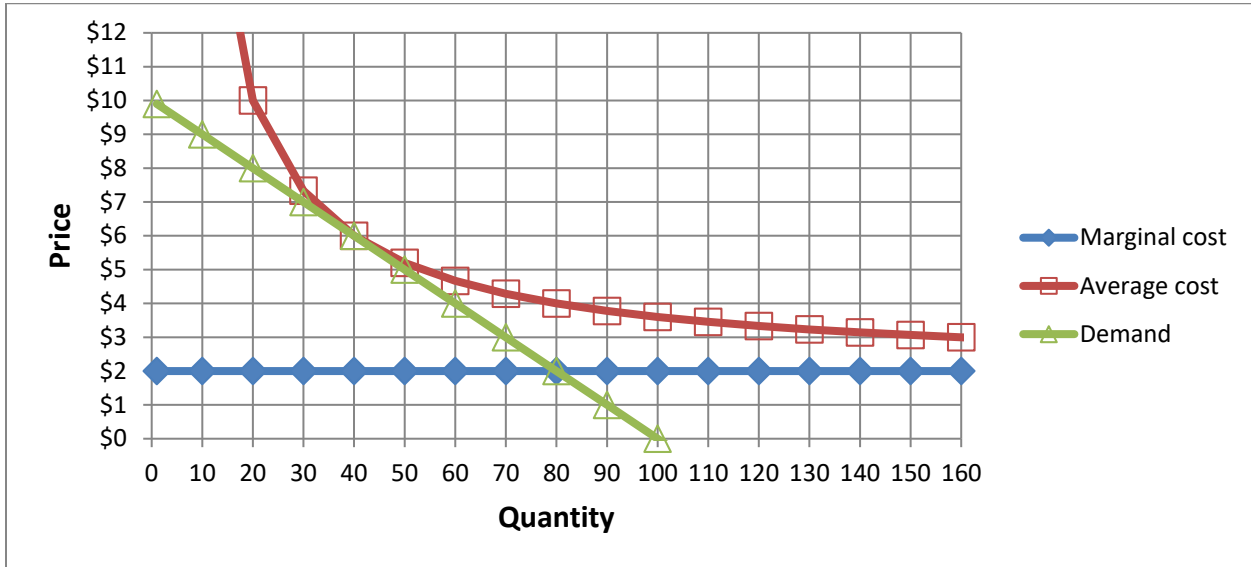
	million
	\$
	\$

Second, alternatively assume the firms *collude* with each other, setting price jointly as a cartel to maximize the sum of their profits.

- d. *Using a straightedge*, draw and label the colluding firms' marginal revenue curve.
- e. What total quantity will the firms produce?
- f. If output increased by one more unit at any firm, total costs would increase by how much?
- g. What price will the firms jointly set?
- h. Compute the deadweight loss from collusion.

	million
	\$
	\$
	\$ million

(6) [Monopolistic competition: 20 pts] Bessie sells ice cream cones from a stand on the beach. The graph below shows her cost curves and demand curve.



a. Although there are other ice-cream stands on the same beach, Bessie's demand curve slopes down. Does that indicate that consumers view ice cream from different stands as *perfect substitutes* or *differentiated products*?

First suppose that Bessie sets a price of \$8, for some unknown reason.

- b. How many ice cream cones will she sell?
- c. Will Bessie make a *profit* or a *loss* ?
- d. How much?

cones
\$

Now suppose that Bessie sets a price to maximize her profit.

- e. *Using a straightedge*, draw and label Bessie's marginal revenue curve.
- f. How many cones will Bessie sell?
- g. What price will Bessie set?
- h. What is Bessie's marginal cost?
- i. What is Bessie's average cost?

cones
\$
\$
\$

j. Bessie clearly has market power (that is, the power to set price) because her demand curve slopes down. So why does she have zero economic profit, unlike a monopolist? Give the most plausible explanation.

III. Critical thinking: Write a one-paragraph essay answering *one* question below (your choice). [4 pts]

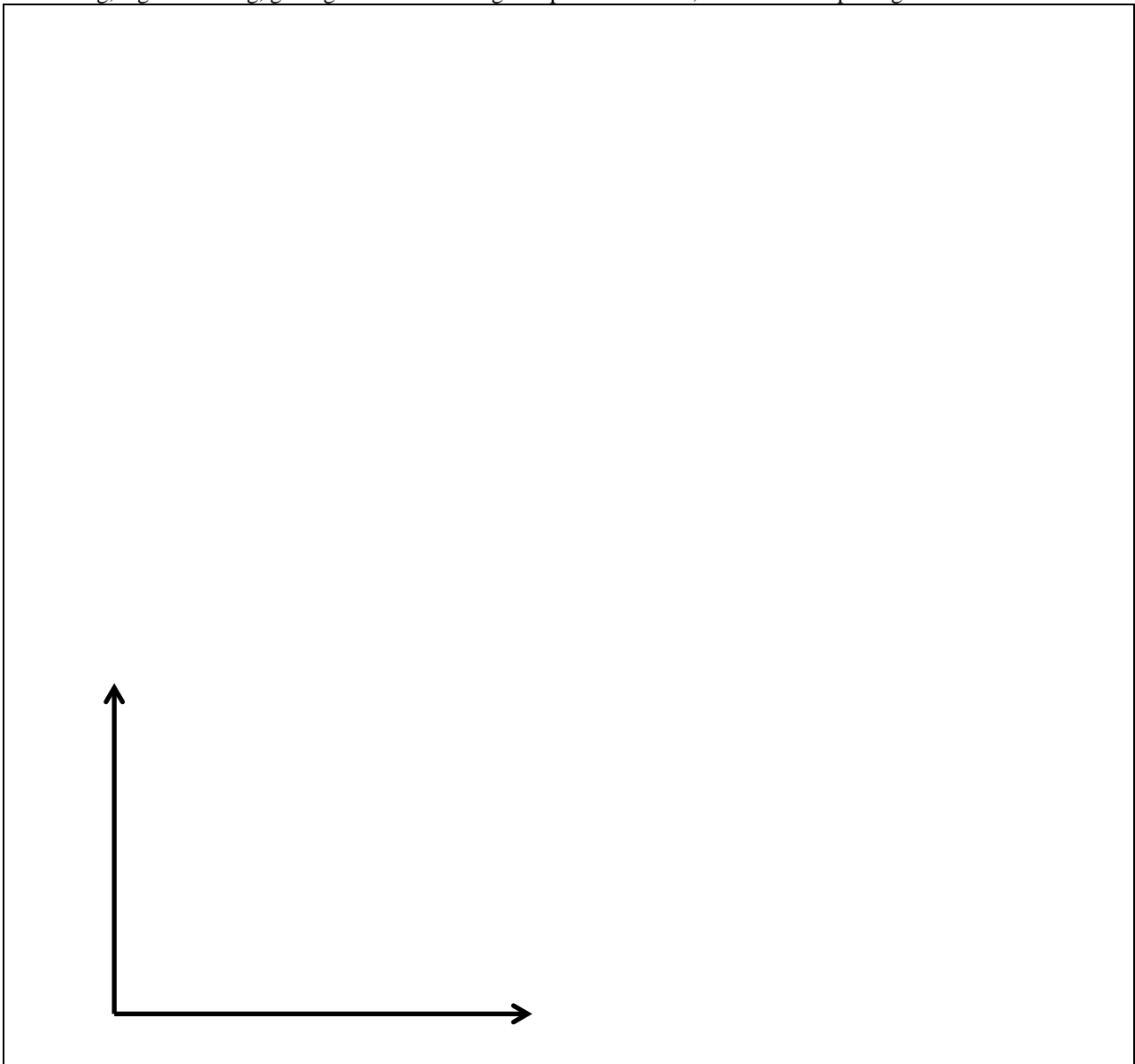
(1) Suppose the price of pencils is \$0.10 and the price of pens is \$0.50 and that all markets are competitive. What must be the slope of the economy's production-possibility curve, with pencils on the vertical axis and pens on the horizontal axis. Explain your reasoning. Sketch a graph of the production-possibility curve, labeling all axes.

(2) Which producers of ice cream are more likely to take price as given and therefore perceive that they face perfectly elastic (horizontal) demand?

- producers of generic ice cream, or
- producers of gourmet ice cream (such as Ben and Jerry's, Haagen Dazs, etc.).

Explain your reasoning. (Ignore the graph.)

Please circle the question you are answering. Write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.



[end of exam]