ECON 173 - Intermediate Microeconomic Analysis
Drake University, Fall 2025
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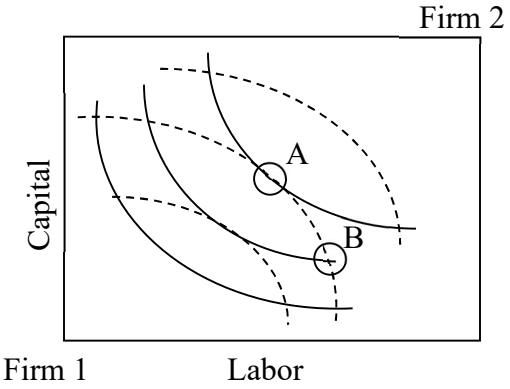
EXAMINATION 4 VERSION B
"General Equilibrium and Market Power"
November 19, 2025

INSTRUCTIONS: This exam is closed-book, closed-notes. Calculators, mobile phones, and wireless devices are NOT permitted. Point values for each question are noted in brackets.

I. MULTIPLE CHOICE: Circle the one best answer to each question. Feel free to use margins for scratch work [1 pt each—8 pts total].

The next three questions refer to the following Edgeworth box diagram for production. The solid curves are Firm 1's isoquants. The dashed curves are Firm 2's isoquants.



(1) From allocation A, *both* firms can produce more output if
a. Firm 1 gives Firm 2 some capital, and Firm 2 gives Firm 1 some labor.
b. Firm 1 gives Firm 2 some labor, and Firm 2 gives Firm 1 some capital.
c. Firm 1 gives Firm 2 some capital and some labor.
d. Firm 2 gives Firm 1 some capital and some labor.
e. No trade will allow both firms to produce more output.

(2) From allocation B, *both* firms can produce more output if
a. Firm 1 gives Firm 2 some capital, and Firm 2 gives Firm 1 some labor.
b. Firm 1 gives Firm 2 some labor, and Firm 2 gives Firm 1 some capital.
c. Firm 1 gives Firm 2 some capital and some labor.
d. Firm 2 gives Firm 1 some capital and some labor.
e. No trade will allow both firms to produce more output.

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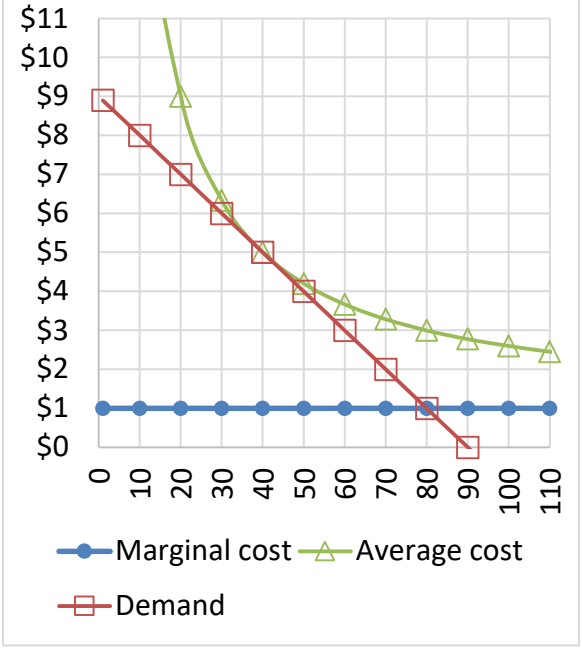
(3) An industry is a natural monopoly if
a. one firm owns all the key natural resources required to produce the product.
b. a firm's average cost is negatively related to its quantity.
c. the industry became a monopoly without government interference.
d. the only seller in the market sells a natural or "green" product.

(4) Monopoly causes economic inefficiency because
a. monopoly prices are unfair.
b. it is unfair for one firm to control the market.
c. monopolists are usually wealthier than their customers.
d. some consumers, willing to pay the marginal cost of the product, are not served.
e. monopolists enjoy profits, called monopoly rents, even in the long run.

(5) Suppose all the firms in an industry reach an agreement to raise the product price above the competitive level and thereby maximize the sum of their profits. Then each firm has an incentive to cheat on the agreement by individually
a. decreasing its price.
b. producing less output than its quota as specified in the agreement.
c. increasing its price even further.
d. all of the above.

(6) Which market model predicts the lowest equilibrium price?
a. Price competition.
b. Collusion to maximize joint profits.
c. Cournot oligopoly.
d. All models predict the same equilibrium price, if all use the same assumptions about market demand and marginal cost.

The next two questions refer to the following graph of a representative firm under monopolistic competition in long run equilibrium.

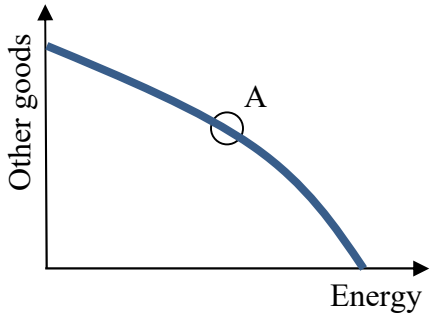


(7) Long-run equilibrium quantity for this firm is about
a. 20 units of output.
b. 40 units of output.
c. 60 units of output.
d. 80 units of output.
e. 90 units of output.

(8) Long-run equilibrium price for this firm is about
a. $1 .
b. $3 .
c. $5 .
d. $7 .
e. $9 .

II. SHORT ANSWER: Please write your answers in the boxes on this question sheet. Use margins for scratch work.

(1) [General equilibrium: 8 pts] Consider the graph at right of an economy's production-possibility curve. Assume this economy is in general competitive equilibrium at point A, where the slope of the production-possibility curve is **–4**.



a. What is the opportunity cost of a unit of energy? In other words, how many units of other goods must be given up in order to produce one more unit of energy?

units of other goods

b. What is the opportunity cost of a unit of other goods? In other words, how many units of energy must be given up in order to produce one more unit of other goods?

units of energy

c. Consider the typical consumer's budget line with other goods on the vertical axis and energy on the horizontal axis. What must be the slope of every consumer's budget line in this economy?

d. If the price of a unit of other goods is **$ 8**, then what must be the price of a unit of energy?

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(2) [Marginal revenue: 6 pts] Suppose a coffee vendor with market power is now selling 10 cups of coffee per hour at a price of $4.00. If she cuts the price to $3.75, she can sell one more cup per hour (that is, a total of 11 cups per hour).

a. Compute the vendor's marginal revenue for the 11^{th} cup. $

Suppose the marginal cost of making a cup of coffee is $2.00 per cup, and suppose the vendor does lower her price to $3.75 to sell 11 cups per hour.

b. Will the vendor's hourly profit *increase* or *decrease*?

c. By how much? $

(3) [Monopoly price discrimination: 4 pts] Suppose Nutcracker Ballet believes that the elasticity of demand for admission by adults is **−1.5**, and the elasticity of demand by children is **−7** . Assume the ballet has a marginal cost of **$ 12** per admission.

a. Compute the ballet's profit-maximizing admission price for adults. $

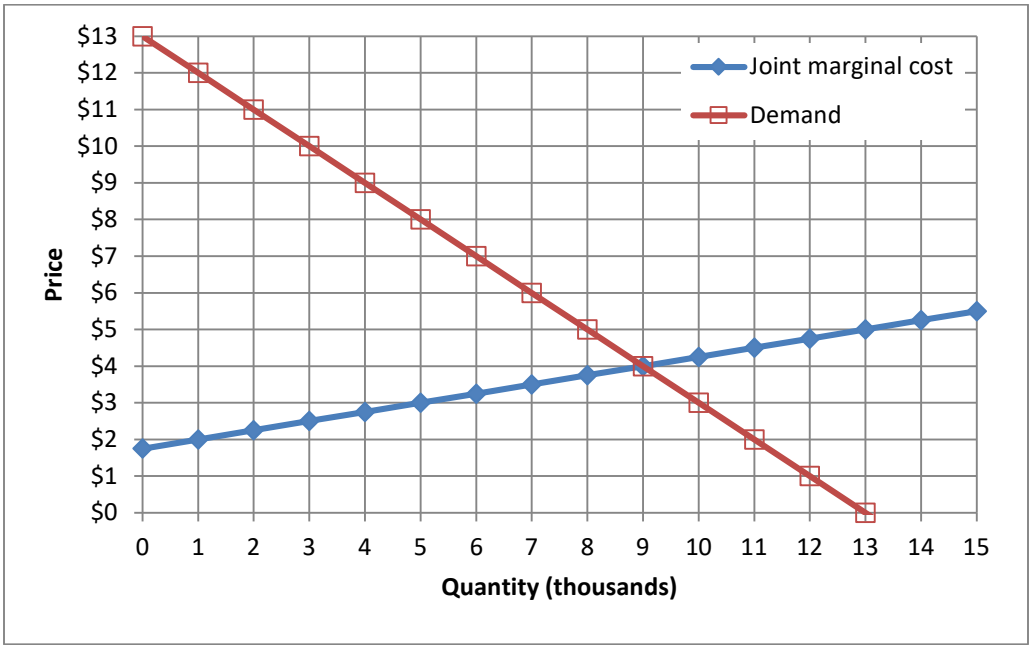
b. Compute the ballet's profit-maximizing admission price for children. $

(4) [Lerner index of market power: 4 pts] The Lerner index of market power is defined as the fraction of price that represents a markup over marginal cost due to market power: L = (P-MC)/P. Suppose a manufactured good has a price elasticity of demand of **-5**.

a. Compute the Lerner index if this market is a monopoly.

b. Compute the Lerner index if this market is a symmetric Cournot duopoly of **2** firms.

(5) [Collusion/joint profit maximization: 16 pts] Three firms produce laundry soap. Market demand and the three firms' joint marginal cost are shown in the graph below.



First, suppose these firms engage in price competition.

a. Compute competitive equilibrium market price. $\$$

b. Compute competitive equilibrium market quantity. thousand

c. Compute the amount of deadweight loss. $\$$ thousand

Now suppose these firms form a cartel to maximize jointly the sum of their profits. The equation for demand is **P = 13 – Q**, where Q = quantity in thousands.

d. Find the equation for the cartel's marginal revenue.

MR =

e. Carefully plot and label the cartel's marginal revenue curve in the graph above.

f. What price will the firms jointly set? $\$$

g. How much output will the firms produce, in total? thousand

h. Compute the amount of deadweight loss. $\$$ thousand

(6) [Game theory: 12 pts] High-tech firms Pear and Giggle are choosing technical standards for a new handheld device. Pear prefers the "red" standard and Giggle prefers the "blue" standard. However, if they choose different standards, their products cannot interconnect and they both lose many customers. Their situation is expressed by the following game in normal form.

		Giggle: Red	Giggle: Blue
Pear	Red	Pear gets \$10 million. Giggle gets \$5 million.	Pear gets \$1 million. Giggle gets \$1 million.
	Blue	Pear gets \$1 million. Giggle gets \$1 million.	Pear gets \$5 million. Giggle gets \$10 million.

a. Which outcomes of this game (if any) are Pareto-optimal[1]? Answer "YES" or "NO."

Pear plays "Red" and Giggle plays "Red"	
Pear plays "Red" and Giggle plays "Blue"	
Pear plays "Blue" and Giggle plays "Red"	
Pear plays "Blue" and Giggle plays "Blue"	

b. Which outcomes of this game (if any) are dominant-strategy equilibria[2]? Answer "YES" or "NO."

Pear plays "Red" and Giggle plays "Red"	
Pear plays "Red" and Giggle plays "Blue"	
Pear plays "Blue" and Giggle plays "Red"	
Pear plays "Blue" and Giggle plays "Blue"	

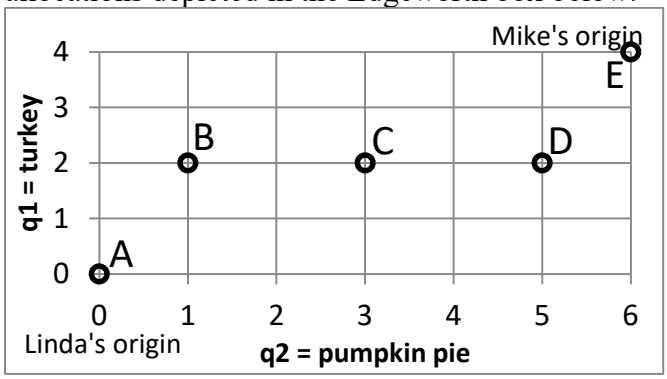
c. Which outcomes of this game (if any) are Nash equilibria in pure strategies? Answer "YES" or "NO."

Pear plays "Red" and Giggle plays "Red"	
Pear plays "Red" and Giggle plays "Blue"	
Pear plays "Blue" and Giggle plays "Red"	
Pear plays "Blue" and Giggle plays "Blue"	

[1] Ignore the welfare of consumers.
[2] "Equilibria" is the plural form of "equilibrium."

III. PROBLEMS: Please write your answers in the boxes on this question sheet. Show your work and circle your final answers.

(1) [Exchange efficiency: 12 pts] Linda and Mike both like turkey (q_1) and pumpkin pie (q_2). Linda's utility function is $\mathbf{U_L = q_1\, q_2}$. Mike's utility function is $\mathbf{U_M = q_1\, q_2^5}$. A total of 4 servings of turkey and 6 slices of pumpkin pie must be divided between them. Consider the allocations depicted in the Edgeworth box below.



a. Is allocation A Pareto-efficient? Why or why not?

b. Is allocation B Pareto-efficient? Why or why not?

c. Is allocation C Pareto-efficient? Why or why not?

d. Is allocation D Pareto-efficient? Why or why not?

e. Is allocation E Pareto-efficient? Why or why not?

f. **Sketch and label the contract curve** in the Edgeworth box above.

(2) [Monopoly, profit maximization: 12 pts] Suppose a monopolist has constant marginal and average cost equal to **$4**. This monopolist faces a demand curve given by **P = 16 – (Q/10).** Show your work and circle your final answers. Note: question continues on next page. Use graph at bottom of next page for scratch work.

a. Find the monopolist's total revenue function.

b. Find the monopolist's marginal revenue function.

c. Compute the monopolist's profit-maximizing level of output Q_M.

d. Compute the monopolist's profit-maximizing price P_M.

e. Compute the monopolist's profit.

f. Compute the social deadweight loss caused by the monopolist. (You may use the graph for scratch work.)

(3) [Cournot duopoly: 14 pts] Suppose two makers of a consumer good form a symmetric Cournot duopoly, each firm setting its own quantity while taking the other firm's quantity as given. Let q_1 = firm #1's quantity and q_2 = firm #2's quantity, so that total market quantity $Q = q_1 + q_2$. The market demand curve is **$P = 16 - (Q/10)$.** Each firm has constant marginal and average cost equal to **$4**. Show your work and circle your final answers. Note: question continues on next page. Use graph at bottom of next page for scratch work.

a. Find an expression for firm #1's revenue, as a function of its own quantity and the quantity produced by the other firm: $TR_1(q_1,q_2)$.

b. Find an expression for firm #1's marginal revenue, as a function of its own quantity and the quantity produced by the other firm: $MR_1(q_1,q_2)$.

c. Find an expression for firm #1's reaction function, showing how much firm #1 will produce for any given quantity set by the other firm: $q_1^* = f(q_2)$.

d. Assume the equilibrium is symmetric (that is, assume $q_1^* = q_2^*$) and compute firm #1's equilibrium quantity q_1^*.

e. Compute total market quantity Q* and the equilibrium price P*.

f. Compute the combined total profit of both firms.

g. Compute the social deadweight loss.

IV. CRITICAL THINKING: Answer just *one* question below (your choice). [4 pts]

(1) Reconsider the monopoly in problem (2) above. Suppose instead the firm is capable of setting a *different price for every unit sold*, engaging in perfect price discrimination. Compute the firm's profit maximizing quantity, its revenue, and its profit. Show your work and circle your final answers. (You may use the graph for scratch work.)

(2) Reconsider the duopoly in problem (3) above. Suppose instead each firm maximizes its own profit while taking the *other firm's price as given*. Compute the equilibrium market quantity, the equilibrium price, and the combined total profit of both firms. Show your work and circle your final answers. (You may use the graph for scratch work.)

Circle the question you are answering and write your answer below. Full credit requires good grammar, legible writing, accurate spelling, and correct reasoning.

[end of exam]