

Test 12 - Oligopoly

Name _____

Group _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) The market structure in which strategic considerations are most important is 1) _____
A) monopolistic competition. B) pure competition.
C) oligopoly. D) pure monopoly.
- 2) Which of the following markets is most likely to be oligopolistic? 2) _____
A) the market for ground coffees B) the market for corn
C) the market for aluminum D) the market for colas
- 3) The market structure in which there is interdependence among firms is 3) _____
A) monopolistic competition. B) monopoly.
C) oligopoly. D) perfect competition.
- 4) In the Cournot duopoly model, each firm assumes that 4) _____
A) rivals will match price cuts but will not match price increases.
B) the price of its rival is fixed.
C) rivals will match all reasonable price changes.
D) the output level of its rival is fixed.
- 5) Which of the following can be thought of as a barrier to entry? 5) _____
A) strategic actions by incumbent firms. B) patents.
C) scale economies. D) all of these.
- 6) What is one difference between the Cournot and Stackelberg models? 6) _____
A) Profits are zero in Cournot and positive in Stackelberg.
B) In Cournot, a firm has the opportunity to react to its rival.
C) In Cournot, both firms make output decisions simultaneously, and in Stackelberg, one firm sets its output level first.
D) In Stackelberg, both firms make output decisions simultaneously, and in Cournot, one firm sets its output level first.

- 7) Which of the following is true in the Stackelberg model? 7) _____
- A) The first firm produces more than its rival.
 - B) The first firm produces less than its rival.
 - C) Both firms produce the same quantity.
 - D) Both firms have a reaction curve.
- 8) In the Stackelberg model, there is an advantage 8) _____
- A) to the firm with a dominant strategy.
 - B) to being the first competitor to commit to an output level.
 - C) to waiting until your competitor has committed herself to a particular output level before deciding on your output level.
 - D) to producing an output level which is identical to a monopolist's output level.
- 9) The oligopoly model that is most appropriate when one large firm usually takes the lead in setting price is the _____ model. 9) _____
- A) game theory
 - B) Stackelberg
 - C) Cournot
 - D) prisoner's dilemma
- 10) In which oligopoly model(s) do firms earn zero profit? 10) _____
- A) Bertrand.
 - B) Cournot.
 - C) Stackelberg.
 - D) Oligopoly firms always earn positive economic profits.
- 11) Which statement most nearly describes a Nash equilibrium applied to price competition? 11) _____
- A) Given the prices chosen by its competitors, no firm has an incentive to change their prices from the equilibrium level.
 - B) One dominant firm sets the price, and the other firms take that price as if it were given by the market.
 - C) Two firms get together and set the price that maximizes joint profits.
 - D) Each firm automatically moves to the purely competitive equilibrium because it knows the other firm will eventually move to that price anyway.
- 12) The oligopoly model that predicts that oligopoly prices will tend to be very rigid is the _____ model. 12) _____
- A) Stackelberg
 - B) dominant firm
 - C) kinked demand
 - D) Cournot

- 13) Suppose that three oligopolistic firms are currently charging \$12 for their product. The three firms are about the same size. Firm A decides to raise its price to \$18, and announces to the press that it is doing so because higher prices are needed to restore economic vitality to the industry. Firms B and C go along with Firm A and raise their prices as well. This is an example of _____
- A) the dominant firm model.
 - B) collusion.
 - C) the Stackelberg model.
 - D) price leadership.
 - E) none of the above.
- 14) In the kinked demand curve model, if one firm reduces its price _____
- A) other firms will compete on a non-price basis.
 - B) other firms will raise their price.
 - C) other firms will also reduce their price.
 - D) both A and B are correct.
 - E) both B and C are correct.
- 15) The kinked demand curve model is based on the assumption that each firm _____
- A) considers its rival's price to be fixed.
 - B) believes rivals will match all price changes.
 - C) considers its rival's output to be fixed.
 - D) believes rivals will never match price changes.
 - E) none of the above.

Scenario 1:

Suppose mountain spring water can be produced at no cost and that the demand and marginal revenue curves for mountain spring water are given as follows:

$$Q = 6000 - 5P \quad MR = 1200 - 0.4Q$$

- 16) Refer to Scenario 1. What is the profit maximizing price of a monopolist? _____
- A) \$900
 - B) \$800
 - C) \$400
 - D) \$600
 - E) none of the above

Scenario 2:

You are studying a market for which the kinked demand curve model applies. The kinked demand curve is as follows:

$$Q = 1200 - 5P \quad \text{for } 0 \leq Q < 150$$

$$Q = 360 - P \quad \text{for } 150 \leq Q$$

The marginal cost is given as:

$$MC = Q$$

- 17) Refer to Scenario 2. What is the profit maximizing price? 17) _____
- A) 240
 - B) 205.72
 - C) 210
 - D) all of the above
 - E) none of the above

- 18) Refer to Scenario 2. Suppose that the marginal cost falls such that: 18) _____
- $$MC = Q - 10$$
- What is the profit maximizing price?
- A) 240
 - B) 210
 - C) 205.72
 - D) all of the above
 - E) none of the above

The following integrated series of questions relates to several sections in the text.

Scenario 3:

Suppose a stream is discovered whose water has remarkable healing powers. You decide to bottle the liquid and sell it. The market demand curve is linear and is given as follows:

$$P = 30 - Q$$

The marginal cost to produce this new drink is \$3.

- 19) Refer to Scenario 3. What will be the price of this new drink in the long run if the industry is a Cournot duopoly? 19) _____
- A) \$3
 - B) \$12
 - C) \$13.50
 - D) \$9
 - E) none of the above

- 20) Refer to Scenario 3. What price would this new drink sell for if it sold in a competitive market? 20) _____
- A) \$13.50 B) \$16.50 C) 0 D) \$27 E) \$3

21) Refer to Scenario 3. What will be the price of this new drink in the long run if the firms in the industry collude with one another to maximize joint profit? 21) _____

- A) \$9
- B) \$16.50
- C) \$12
- D) \$3
- E) none of the above

22) Refer to Scenario 3. What will be the price of this new drink in the long run if the industry is a Stackelberg duopoly? 22) _____

- A) \$13.50
- B) \$12
- C) \$3
- D) \$9
- E) none of the above

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

23) Lambert-Rogers Company is a manufacturer of petrochemical products. The firm's research efforts have resulted in the development of a new auto fuel injector cleaner that is considerably more effective than other products on the market. Another firm, G.H. Squires Company, independently developed a very similar product that is as effective as the Lambert-Rogers formula. To avoid a lengthy court battle over conflicting patent claims, the two firms have decided to cross-license each other's patents and proceed with production. It is unlikely that other petrochemical companies will be able to duplicate the product, making the market a duopoly for the foreseeable future. Lambert-Rogers estimates the demand curve given below for the new cleaner. Marginal cost is estimated to be a constant \$2 per bottle.

$$Q = 300,000 - 25,000P.$$

where P = dollars per bottle and Q = monthly sales in bottles.

- a. Lambert-Rogers and G.H. Squires have very similar operating strategies. Consequently, the management of Lambert-Rogers believes that the Cournot model is appropriate for analyzing the market, provided that both firms enter at the same time. Calculate Lambert-Rogers' profit-maximizing output and price according to this model.
- b. Lambert-Rogers' productive capacity and technical expertise could allow them to enter the market several months before Squires. Choose an appropriate model and analyze the impact of Lambert Rogers being first into the market. Should Lambert-Rogers hurry to enter first?

24) Suppose that the market demand for mountain spring water is given as follows:

$$P = 1200 - Q$$

Mountain spring water can be produced at no cost.

- a. What is the profit maximizing level of output and price of a monopolist?
- b. What level of output would be produced by each firm in a Cournot duopoly in the long run? What will the price be?
- c. What will be the level of output and price in the long run if this industry were perfectly competitive?

25) The market for an industrial chemical has a single dominant firm and a competitive fringe comprised of many firms that behave as price takers. The dominant firm has recently begun behaving as a price leader, setting price while the competitive fringe follows. The market demand curve and competitive fringe supply curve are given below. Marginal cost for the dominant firm is \$0.75 per gallon.

$$Q_M = 140,000 - 32,000P$$

$$Q_F = 60,000 + 8,000P,$$

where Q_M = market quantity demanded, and Q_F = the supply of the competitive fringe. Quantities are measured in gallons per week, and price is measured as a price per gallon.

- a. Determine the price and output that would prevail in the market under the conditions described above. Identify output for the dominant firm as well as the competitive fringe.
- b. Assume that demand curve shifts rightward by 40,000 units. Show that the dominant firm is indeed a price leader. What output (leader and follower) and market price will prevail after the change in demand?

Answer Key

Testname: OLIGOPOLY

- 1) C
- 2) C
- 3) C
- 4) D
- 5) D
- 6) C
- 7) A
- 8) B
- 9) B
- 10) A
- 11) A
- 12) C
- 13) D
- 14) C
- 15) E
- 16) D
- 17) C
- 18) B
- 19) D
- 20) E
- 21) B
- 22) E
- 23) Denote Lambert-Rogers price and quantity as P_L , Q_L and Squires as P_S , Q_S .

Demand function is given as:

$$Q = 300,000 - 25,000P$$

Solve for P:

$$Q - 300,000 = -25,000P$$

$$P = 12 - 0.00004Q$$

Outcome under Cournot model:

a.

$$TR_L = P_L \cdot Q_L$$

$$TR_L = (12 - 0.00004Q)Q_L$$

$$Q = Q_L + Q_S$$

$$TR_L = [12 - 0.00004(Q_L + Q_S)]Q_L$$

$$TR_L = 12Q_L - 0.00004Q_L^2 - 0.00004Q_LQ_S$$

$$MR_L = 12 - 0.00008Q_L - 0.00004Q_S$$

Set $MR_L = MC$

$$12 - 0.00008Q_L - 0.00004Q_S = 2$$

$$-0.00008Q_L - 0.00004Q_S = -10$$

$$Q_L = 125,000 - 0.5Q_S$$

$$\text{So, } Q_S = 125,000 - 0.5Q_L$$

Substitute for Q_S :

$$Q_L = 62,500 + 0.25Q_L$$

$$Q_L = \frac{62,500}{0.75} = 83,333$$

$$Q = Q_L + Q_S$$

Answer Key

Testname: OLIGOPOLY

$$Q = 83,333 + 83,333 = 166,666$$

$$P = 12 - .00004(166,666)$$

$$P = 12 - 6.67 = \$5.33$$

$$P = \$5.33 \text{ per bottle}$$

166,666 bottles sold per month

b.

The Stackelberg model is appropriate when one firm enters first.

Lambert-Rogers determines its output, which Squires then takes as given.

Lambert's total revenue function is given as:

$$TR_L = 12Q_L - 0.00004Q_L^2 - 0.00004Q_LQ_S$$

Squires reaction function $Q_S = 125,000 - 0.5Q_L$ can be substituted into TR_L , since Squires will take Lambert's output as given.

$$TR_L = 12Q_L - 0.00004Q_L^2 - 0.00004Q_L(125,000 - .5Q_L)$$

$$TR_L = 12Q_L - 0.00004Q_L^2 - 5Q_L + 0.00002Q_L^2$$

$$TR_L = 7Q_L - 0.00002Q_L^2$$

$$MR_L = 7 - 0.00004Q_L$$

Set $MR_L = MC$

$$7 - 0.00004Q_L = 2$$

$$-0.00004Q_L = -5$$

$$Q_L = 125,000$$

To find Q_S substitute Q_L into S reaction function

$$Q_S = 125,000 - 0.5Q_L$$

$$Q_S = 125,000 - 0.5(125,000)$$

$$Q_S = 62,500$$

$$Q = Q_L + Q_S$$

$$Q = 125,000 + 62,500$$

$$Q = 187,500$$

$$P = 12 - 0.00004(187,500)$$

$$P = 12 - 7.5 = \$4.50$$

Lambert-Rogers gets a much larger share of the market by entering first. It should advance its schedule in order to enter first.

$$L = \frac{8.68 - 7.34}{8.68} = 0.15$$

Answer Key

Testname: OLIGOPOLY

24) *a.*

The monopoly level of output is found where marginal revenue equals marginal cost. The marginal revenue curve has the same price intercept as the demand curve and twice the slope. Thus:

$$MR = 1,200 - 2Q$$

Setting MR equal to MC (which is zero in this problem) yields:

$$1,200 - 2Q = 0$$

$$Q = 600$$

$$P = 1,200 - 600 = 600$$

b.

The Cournot equilibrium is found by using the reaction curves of the two firms to solve for levels of output. The reaction curve for firm 1 is found as follows:

$$R1 = PQ_1 = (1,200 - Q)Q_1$$

$$= 1,200Q_1 - (Q_1 + Q_2)Q_1$$

$$= 1,200Q_1 - Q_1^2 - Q_2Q_1$$

The firm's marginal revenue MR1 is just the incremental revenue R1 resulting from an incremental change in output ΔQ_1 :

$$MR1 = \Delta R1 / \Delta Q_1 = 1,200 - 2Q_1 - Q_2$$

Setting MR1 equal to zero (the firm's marginal cost) and solving for Q_1 yields the reaction curve for Q_1 :

$$\text{Firm 1's Reaction Curve: } Q_1 = 600 - (1/2)Q_2$$

Going through the same calculations for firm 2 yields:

$$\text{Firm 2's Reaction Curve: } Q_2 = 600 - (1/2)Q_1$$

Solving the reaction curves simultaneously for Q_1 and Q_2 yields: $Q_1 = Q_2 = 400$. Thus the total output is 800 and the price will be \$400.

c.

In the industry were perfectly competitive, price will be equated to marginal cost.

$$P = 1,200 - Q = 0 \text{ or } Q = 1,200 \text{ and } P = 0$$

25) *a.*

$$Q_M = 140,000 - 32,000P$$

$$Q_F = 60,000 + 8,000P$$

Denote dominant firm demand curve as Q_D .

$$Q_D = Q_M - Q_F$$

$$Q_D = 140,000 - 32,000P - (60,000 + 8,000P)$$

$$Q_D = 80,000 - 40,000P$$

Solve for P

$$Q_D - 80,000 = -40,000P$$

$$P = 2 - 0.000025Q_D$$

$$MR_D = 2 - 0.00005Q_D$$

Marginal cost for the dominant firm is \$0.75. Equate MR_D to MC_D

$$2 - 0.00005Q_D = 0.75$$

$$-0.00005Q_D = -1.25$$

$$Q_D = 25,000$$

Answer Key

Testname: OLIGOPOLY

$$P = 2 - 0.000025(25,000)$$

$$P = 2 - 0.625 = 1.375 \text{ per gallon}$$

Fringe takes dominant firm price as given

$$Q_F = 60,000 + 8,000(1.375)$$

$$Q_F = 71,000$$

$$Q_T = 25,000 + 71,000 = 96,000$$

b.

A 40,000 increase in demand curve to:

$$Q_M = 180,000 - 32,000P$$

$$Q_F = 60,000 + 8,000P$$

$$Q_D = 180,000 - 72,000P - (60,000 + 8,000P)$$

$$Q_D = 120,000 - 40,000P$$

Solve for P

$$Q_D - 120,000 = -40,000P$$

$$P_D = 3 - 0.000025Q_D$$

$$MR_D = 3 - 0.00005Q_D$$

setting $MR_D = MC_D$

$$3 - 0.00005Q_D = 0.75$$

$$-0.00005Q_D = -2.25$$

$$Q_D = 45,000$$

$$P_D = 3 - 0.000025(45,000)$$

$$P_D = 3 - 1.125 = \$1.875$$

Fringe again follows

$$Q_F = 60,000 + 8,000(1.875)$$

$$Q_F = 75,000$$

$$Q_T = 45,000 + 75,000 = 120,000$$

We can see that when demand changed, the dominant firm raised price. The competitive fringe took the new price as given and adjusted output accordingly.