

**UBC**  
**Managerial Economics: Commerce/ FRE 295**

**October 25, 2012**

**NAME:** \_\_\_\_\_, \_\_\_\_\_ (please print)  
          (Surname)                              (Given Names)

**SIGNATURE:** \_\_\_\_\_

**STUDENT NUMBER** \_\_\_\_\_

**SECTION:** \_\_\_\_\_

**PROFESSOR'S NAME:** \_\_\_\_\_

**EXAM ROOM** \_\_\_\_\_

|             |                 |              |
|-------------|-----------------|--------------|
| Section 101 | MW 10:00-11:30  | J. Brander   |
| Section 102 | MW 11:30 – 1:00 | J. Brander   |
| Section 103 | MW 1:00-2:30    | M. Tappata   |
| Section 104 | MW 2:30-4:00    | M. Tappata   |
| Section 105 | MW 4:00-5:30    | S. Meyer     |
| Section 106 | TTh 11:00-12:30 | J. Vercammen |
| Section 107 | TTh 2:00-3:30   | R. Shrestha  |

**Maximum Score: 100**

**Time Available: 1 hour and 50 minutes (110 minutes).**

**Instructions:**

There are two parts to this exam. The first part consists of 20 multiple-choice questions, and the second contains 5 longer questions. Please answer all multiple choice questions and **choose 4 out of 5 longer questions**. If you do all 5 questions the last question will not be marked. The longer questions are worth 60% of the exam so you should make sure you leave enough time to do these questions.

This is a closed-book exam. You may not use books, notes, or electronic devices such as smartphones except that you may use a non-graphing, non-programmable calculator.

You may use pen or pencil. Answers must go in the indicated places. For the multiple choice questions you must transfer your answers to the answer sheet, which is the next page in this exam.

For each longer question your answer must fit in the indicated space. However, if you wish to re-do a question, you may cross out your answer and provide the answer somewhere else on the exam, such as on the back of a page, but the total space used should be no more than allowed in the original question.

Please do not leave the exam room during the final 15 minutes of the exam, as that is disruptive to other students. If you have a question or want scrap paper just raise your hand.

**PART I. MULTIPLE CHOICE ANSWERS (Use letters A, B, C, or D.) Put your answers here. Multiple choice answers placed elsewhere will not be marked.**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

9. \_\_\_\_\_

10. \_\_\_\_\_

11. \_\_\_\_\_

12. \_\_\_\_\_

13. \_\_\_\_\_

14. \_\_\_\_\_

15. \_\_\_\_\_

16. \_\_\_\_\_

17. \_\_\_\_\_

18. \_\_\_\_\_

19. \_\_\_\_\_

20. \_\_\_\_\_

**Total Multiple Choice Marks:** \_\_\_\_\_ / 40

**PART II: Marks for Longer Questions: Put your answers in the indicated place on each page. Choose 4 questions out of 5.**

Question 1. \_\_\_\_\_

Question 2. \_\_\_\_\_

Question 3. \_\_\_\_\_

Question 4. \_\_\_\_\_

Question 5. \_\_\_\_\_

**Total Longer Question Marks:** \_\_\_\_\_ / 60

**Overall Mark:** \_\_\_\_\_ / 100

## PART I

### MULTIPLE CHOICE QUESTIONS

Each question has one correct response. There are 20 questions. Each question is worth 2 pts. If you choose the correct answer you get 2 pts. Otherwise you get no points for that question. **Transfer your answers to the answer page (p. 2).**

1. Which of the following would most likely result in a shift to the right in the demand curve for bicycles?

- A. A decrease in the price of gasoline.
- B. An increase in the cost of a key input used for bicycle manufacturing.
- C. A price increase for public transit.
- D. A reduction in the number of bicycle lanes available.

2. Demand for blueberries is given by  $Q^d = 800 - 500p$ . The supply curve is  $Q^s = 200 + 100p$ . Which of the following statements is true?

- A. The equilibrium price exceeds 1.
- B. A price ceiling of 1.10 would cause excess demand.
- C. The equilibrium quantity is 300.
- D. All of the above.

3. Assume that we have a downward sloping linear demand curve.

- A. The price elasticity of demand will be a constant equal to the slope of demand.
- B. The price elasticity will vary along the line with the inelastic portion at higher prices.
- C. Revenue will be maximized only if the demand curve is perfectly elastic.
- D. None of the above.

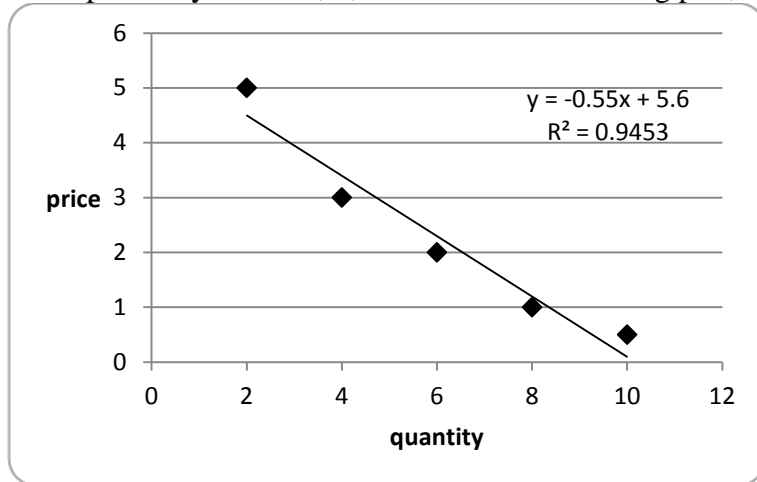
4. Suppose the demand for avocados in Vancouver is  $Q = a + bp + e$ , where  $e$  is a random error that is sometimes positive, sometimes negative, and sometimes zero. We estimate a linear regression equation and obtain estimates of  $a$  and  $b$ . It follows that

- A. The  $R^2$  could be equal to 1.
- B.  $a$  and  $b$  must be positive integers
- C. The  $R^2$  must be less than 1 and cannot be negative.
- D. Avocados must be a normal good.

5. We have the following price and quantity information from a local lemonade stand entered in a spreadsheet.

| Quantity, x | Price, y |
|-------------|----------|
| 2           | 5        |
| 4           | 3        |
| 6           | 2        |
| 8           | 1        |
| 10          | 0.5      |

Using the trendline option in Excel and treating price as the dependent variable, y, and quantity as the explanatory variable, x, we obtain the following plot, regression line, and  $R^2$ .



From this regression which statement is true?

- A. The estimated demand curve is  $Q = 5.6 - 0.55p$  (rounded to 2 decimals)
- B. If we write demand as  $Q = a + bp$ , our results indicate that  $b < -1$ .
- C. The regression line suggests a perfect fit with the data.
- D. None of the above.

6. Erin lives in Quebec City and loves to eat dessert. She spends her entire allowance on yoghurt and pudding. The price of a cup of yoghurt is \$4 whereas the price of a cup of pudding is \$ 8. At the current level of consumption, her marginal utility from yoghurt is 20 and that from pudding is 32. She has standard indifference curves (bowed in towards the origin) and wants to maximize utility.

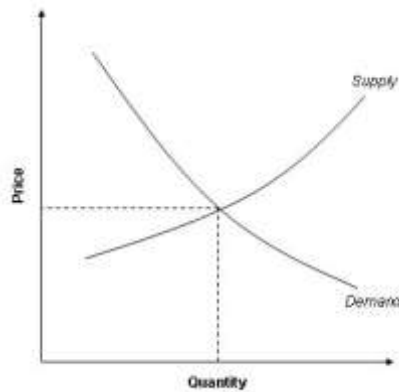
- A. She can increase her utility by consuming more yoghurt.
- B. She can increase her utility by consuming more pudding.
- C. The last dollar spent on yoghurt provides her with more utility than the last dollar spent on pudding.
- D. Both A and C.

7. You have already spent \$500 registering your car with ICBC. If you spend an additional \$2,000 on repairs, you can drive it to school for the year. Alternatively, your friend offers to rent it from you for \$3,000 and also offers to reimburse 1/2 of your registration fee (that is \$250) for the year without requiring you to do any repairs. What is your annual opportunity cost of using the car to drive to school?
- A. \$ 5,250.
  - B. \$ 3,500.
  - C. \$ 5,500.
  - D. \$ 5,000.
8. Suppose a firm has a production function given by  $q = 5LK$ , where  $L$  and  $K$  represent labor and capital units respectively. The wage rate is  $w$  and rental rate of capital is  $r$ . These factor prices are constant. For this production function:
- A. The marginal product of labour is diminishing.
  - B. Average cost declines as the firm produces more.
  - C. The marginal product of  $K$  and  $L$  are both equal to 5.
  - D.  $L$  and  $K$  are perfect substitutes.
9. Assume that it costs a firm \$8,000 to produce 50 units of output,  $Q$ . The variable cost of production is given by  $2Q^2$ .
- A. The firm's fixed cost of production is \$5,000.
  - B. The firm enjoys economies of scale in production for all levels of  $Q$ .
  - C. The cost of producing 60 units is \$10,200.
  - D. Both A and C.
10. Which of the following statements is true?
- A. Limited liability companies cannot borrow more than a legally specified cap or upper limit.
  - B. Government-owned enterprises are required to maximize profits.
  - C. Corporations must be publicly traded companies.
  - D. None of the above
11. The owner of Code Monkey Inc., a software company, asks the management team to select the profit-maximizing price for its unique product. The (inverse) demand curve for this product is given by  $p = 100 - Q$ . The cost function is  $C(Q)=1500$ . The financial compensation for each member of the team is a constant fraction of sales revenue.
- A. Incentives are aligned: managers have an incentive to choose a price that maximizes profits.
  - B. Incentives are misaligned: managers have an incentive to choose a price that is too low.
  - C. Incentives are misaligned: managers have an incentive to choose a price that is too high.
  - D. Managers will choose a price that maximizes revenues but will not maximize profits.

12. Assume that the market for hard drives is perfectly competitive, that all firms are identical and that each has long run cost function  $C(q) = 48 + 3q^2$  where  $q$  is measured in thousands of units per year. The long run equilibrium price is:

- A. Below \$22
- B. \$24
- C. Above \$30
- D. Impossible to determine without more information.

13. The market for avocados is perfectly competitive and is shown in the following diagram. The government sets a subsidy of  $s$  per lb., lowering MC (and hence the supply curve) by amount  $s$ .



- A. Consumer and producer surplus increase.
- B. Consumer surplus increases; producer surplus decreases.
- C. Consumer surplus decreases; producer surplus increases.
- D. None of the above.

14. An important rule of profit-maximizing uniform monopoly pricing is to never choose an output level where demand for the product is inelastic. This rule makes sense because when demand is inelastic:

- A. Profits for the monopolist are always negative.
- B. Marginal revenue is always negative.
- C. Revenue and cost would both be higher if sales were reduced to where demand is elastic.
- D. Sales must be increased to ensure that marginal revenue is equal to marginal cost.

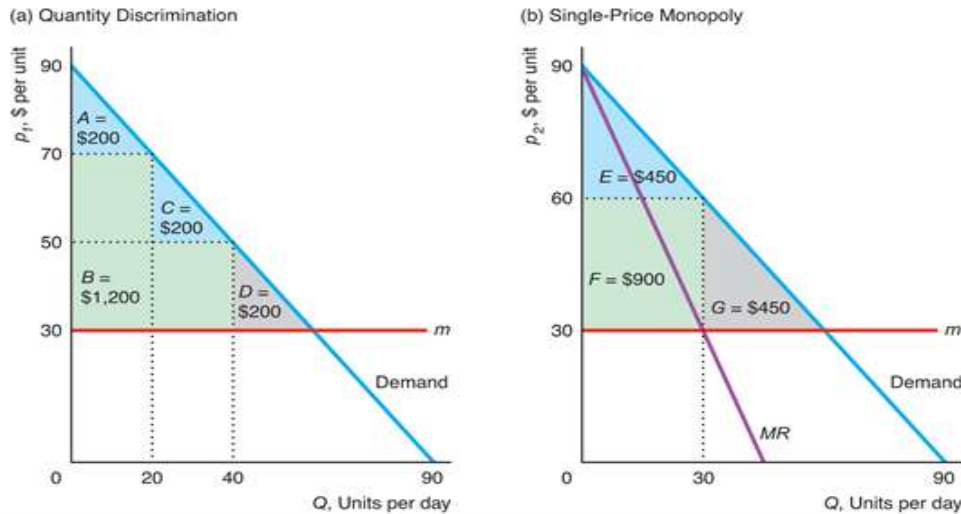
15. Suppose all firms in market A are perfectly competitive, which implies that all firms produce where price is equal to their marginal cost. Suppose market B has a single monopolist that produces where marginal revenue is equal to marginal cost.

- A. Price is equal to marginal revenue in both markets.
- B. Market B has greater deadweight loss than market A.
- C. Deadweight loss will decrease in market A if the demand curve shifts up.
- D. None of the above.

16. Consider a profit-maximizing monopoly fitness centre in a small town. The firm uses two part pricing. Customers pay a monthly membership fee and also pay  $\$p$  per hour when they use the club. Assume all customers are identical. Which of the following statements is true?

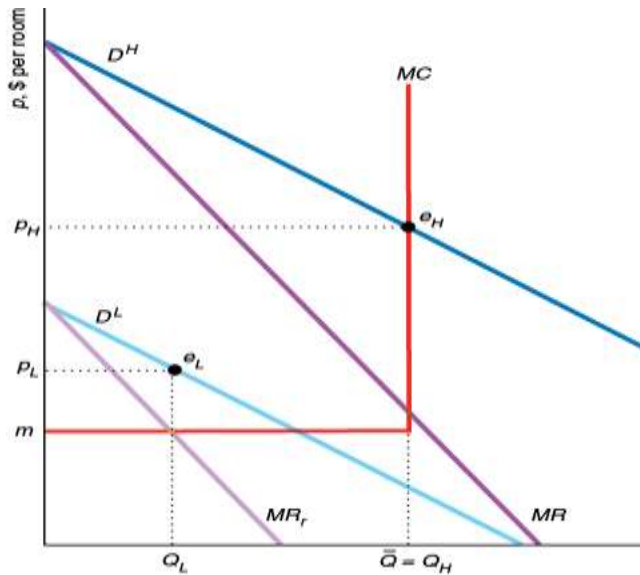
- A. Because the fitness centre has market power it will charge a per hour fee,  $p$ , that exceeds marginal cost.
- B. The fitness centre should charge different membership fees to different customers.
- C. Both A and B.
- D. None of the above.

17. A consumer has a demand curve given by  $p = 90 - Q$ . In the following diagram, panel (a) shows the consequences of quantity-based price discrimination if the firm charges  $\$70$  each for the first 20 units and  $\$50$  each for any additional units. Panel (b) illustrates profit-maximizing uniform monopoly pricing. The red line shows marginal cost. Identify the correct statement from the alternatives below.



- A. The average price paid under quantity-based price discrimination is the same as under uniform monopoly pricing.
- B. Revenue under quantity-based price discrimination exceeds revenue under uniform monopoly pricing by more 600.
- C. Profits are higher with uniform monopoly pricing than with quantity-based price discrimination.
- D. None of the above.

18. Consider a hotel that has high demand in the summer and low demand in the winter. The hotel's profit maximizing peak load pricing strategy is illustrated as follows.



Which statement is true?

- A. Price is higher in winter than in summer.
- B. Marginal revenue is higher in summer than in winter.
- C. Capacity is reached in both periods.
- D. None of the above.

19. Suppose two Cournot duopoly firms produce a homogenous product (such as steel) with constant marginal costs:  $m_1$  for firm 1 and  $m_2$  for firm 2, where  $m_1 < m_2$ . The two firms then switch from the Nash-Cournot equilibrium to form a cartel that maximizes joint profits. (The firms divide up the resulting profits equally.)

- A. The cartel's production will come from firm 1 only.
- B. The total quantity sold in the market will increase.
- C. Deadweight loss in the market will decrease.
- D. None of the above.

20. Consider a Cournot duopoly model with linear demand and constant marginal cost. A firm's best response curve:

- A. Shows the cost minimizing level of production for that firm.
- B. Is flat if the two firms in the duopoly have the same level of marginal cost.
- C. Shifts toward the origin if that firm's marginal cost decreases.
- D. Indicates that the firm will produce less if its competitor chooses to produce more.

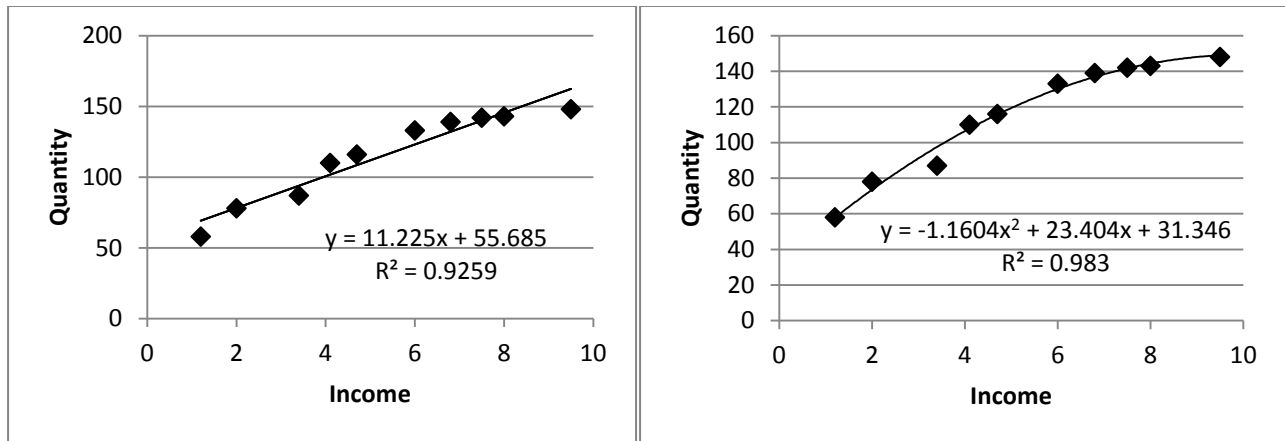


## Part II

### LONGER QUESTIONS

**Choose 4 questions out of 5.** If you do all 5 questions the last question will not be marked. Show your working and provide (brief) explanations where appropriate. Confine your answers to the space provided in the question. You may cross out an answer and do the entire answer somewhere else if necessary but the total space used cannot exceed the original space provided.

1. **Regression and Elasticity.** A supermarket chain used data from focus groups to estimate the effect of income on demand for gourmet ice cream in Vancouver. The following two diagrams show two regressions that were used by the market research team to assess the relationship between income and demand.



a. What are the main points illustrated by these two regression diagrams? List three points and explain them briefly. (Hint: What do these diagrams tell us about the relationship between income and quantity and what do you learn by comparing the two diagrams?) (7 pts)

b. You are asked to provide your **best** estimate of the point income elasticity of demand at an income level of 10. What is your answer? (Hint: Recall that any point elasticity can be calculated using the form  $(dy/dx)(x/y)$ . In this case  $y$  is quantity and  $x$  is income.) Also explain briefly in words how you would calculate the arc income elasticity of demand for an increase in income from  $x_1$  to  $x_2$ . Provide a formula if you can. (8 pts).

## 2. Cost Minimization

A bicycle parts company has production function  $Q = L K^2$  where  $K$  = machine units and  $L$  = labor hours. The wage rate,  $w$ , is \$15 per hour, and the rental rate on machines,  $r$ , is \$60 per unit.

a) At the current level of output, the marginal product of machines is 300 and the marginal product of labor is 200. Draw an appropriate diagram and explain how the firm should change the ratio of the two inputs to lower its cost of producing the current level of output. (7 pts)

b) Determine how much  $L$  and  $K$  the firm would need to use to minimize the cost of producing 2000 units. What is this cost? (8 pts)

### 3. Perfect Competition.

a) The long run equilibrium price in a perfectly competitive market is \$100 and the total quantity traded is  $Q=5000$ . Each firm in the market has a cost of production given by  $C(q) = 500 + 5q^2$ . Derive a firm's average cost curve and marginal cost curve and illustrate these curves in an appropriate diagram. Assuming the industry is in long run equilibrium, calculate and show the quantity produced by each firm. How many firms are in the market? (8 pts).

b) In a perfectly competitive market, the market demand curve is  $Q = 6000 - 10p$  and the supply curve is perfectly elastic at a price of 100. Illustrate the solution in a supply-demand diagram. Determine total consumer surplus and producer surplus in this market and explain why total surplus falls if output is restricted to  $Q=3000$ . (7 pts)

### 4. Pricing

a. A local theatre has found that students have a different demand curve from everybody else. Student inverse demand has been estimated to be  $p_s = 20 - 0.1Q_s$ . The inverse demand curve for all other consumers is  $p_e = 50 - 0.25Q_e$ . The movie theatre's cost function is  $C(Q)=200 + 5Q$  where  $Q = Q_s + Q_e$ . Find the profit-maximizing price to charge each group. (No diagram is needed.) Briefly explain what the resale problem is and how it can be avoided in this case. (8 pts).

b. Joey's snack shack is trying to come up with a strategy to price its customer's favorite snacks (crackers and cheese). The table below shows the willingness to pay of the four different types of consumers that buy snacks at Joey's. Assume costs are zero.

| Consumer type | Crackers | Cheese |
|---------------|----------|--------|
| A             | 3        | 1      |
| B             | 3        | 2.50   |
| C             | 2.50     | 3      |
| D             | 1        | 3      |

Determine Joey's maximum profit if he prices crackers and cheese individually, if he uses pure bundling, and if he uses mixed bundling. Which approach yields the highest profit. Show your working. (7 pts)

**5. Cournot Oligopoly.** Consider a market with linear demand and two identical Cournot duopoly firms (A and B). The firms produce a homogenous commodity with a constant marginal cost of 10. Market demand is given by inverse demand function  $P = 110 - Q$  where  $P$  is the market price and  $Q$  is total production by the two firms (i.e.,  $Q = q_A + q_B$ ).

a. Derive the Cournot best response curves for the two firms. Calculate the Nash-Cournot equilibrium price and quantity. (No diagram is needed.) (8 pts)

b. Find the profit-maximizing price and quantity if the two firms operate as a cartel. How would formation of a cartel affect consumer surplus? Illustrate this effect using a diagram containing a demand curve and the relevant prices and quantities under the two situations: Cournot duopoly and a profit-maximizing cartel. Show the difference in consumer surplus on the diagram. (7 pts).

---

**Extra space for rough work: Material from here on will not be marked.**