

**UCSD**  
**Economics 170B**  
**Midterm**

April 18, 2001  
Professor J. Betts

DO NOT BEGIN OR TURN THE PAGE UNTIL TOLD TO

Please print:           Name: \_\_\_\_\_  
                              Student # \_\_\_\_\_

1. You may use pencil instead of pen if you wish, but exams cannot be submitted for re-marking unless you used pen. If you resubmit your test for regrading we reserve the right to regrade the entire test.
2. You must hand in all materials, including paper used for rough work.
3. Show all of your work.

There is a total of 60 points on this test. You have one hour twenty minutes to finish the quiz.

Good luck!

1. **(13 points)** A monopolist faces a demand curve of  $P = 20 - Q$  and has a total cost curve given by

$$TC = 12 + 4Q + Q^2.$$

a) **(2)** What is the equation for total revenue?

b) **(4)** What are the equations for marginal revenue and marginal cost?

c) **(7)** Solve for the profit-maximizing price and quantity, verify that you have obtained a profit maximum, and calculate the equilibrium profits. Show your work

2. **(22 points)** Each firm in a duopoly adopts a Cournot strategy. The cost functions for these two firms are:

$$C_1 = 0.1q_1^2 + 20q_1 + 100,000$$

$$C_2 = 0.4q_2^2 + 32q_2 + 20,000$$

The two firms produce a homogeneous product, the demand curve for which is:

$$Q = 4000 - 10P$$

a) **(18 points)** Calculate the following in the Cournot equilibrium: the equilibrium output of firm 1, the equilibrium output of firm 2 and the equilibrium price. Show all of your work:

b) What is the definition of Bertrand competition? Would the profits of the two firms be higher or lower if there is Bertrand competition? You DO NOT have to work out the equilibrium in this case, but do explain in a sentence or two. **(4 points)**

3. **(20 points)** Suppose that in a given industry there is a dominant firm which sets prices, knowing the the much smaller “fringe firms” will accept that price. Market demand is given by

$$P = 1000 - Q$$

and the (aggregate) supply curve for all of the fringe firms is

$$P = 200 + Q_f$$

where  $P$  is the market price,  $Q$  is total quantity sold, and  $Q_f$  is the amount supplied by the fringe firms. The dominant firm has a total cost curve given by

$$TC = 100Q_d$$

where  $Q_d$  is the quantity produced by the dominant (leader) firm.

a) Derive the leader’s demand curve. (If you want, you may optionally start with a graph to gain intuition. But this is not required.) **(5)**

b) Using your answer to a), derive the equilibrium values of  $Q_d$ ,  $Q_f$ , and  $P$ . Show all of your work. **(15)**

4. **(5 points)** Suppose that you are trying to decide on whether to sell two software products, PC-TarotCard and PC-OuijaBoard, separately or at a bundled price. The marginal cost of either product is 0. Based on a market survey you realize that the market is split equally into consumer types A and B. Here are the valuations they place on the two products:

	PC-TarotCard	PC-OuijaBoard
Consumer A	1	4
Consumer B	3	1

a) If you sell the products separately, what is the profit maximizing price for PC-TarotCard and PC-OuijaBoard,  $P_T$  and  $P_O$ ? **(2 points)**

b) If instead you bundle the two products together, what is the profit-maximizing price for the bundle? Which is the better choice for your company, individual pricing as in part a) or to sell these pieces of software as a bundle? **(3 points)**