

**Problem Set #1**

(due April 16, 2001)

**Question 1 (Long-run market structure):**

Answer TRUE, FALSE or UNCERTAIN and briefly explain your reasoning

(a) If firms have to incur positive fixed production costs and compete in prices, there will be only one firm in the market in the long-run.

(b) The government has recently increased its antitrust enforcement (one example being the Microsoft case). This will reduce the number of firms in industries that are affected by this enforcement

(c) Consider the market for french fries. There are two types of consumers: individual households and restaurants /catering companies. We would expect to have a lot of firms supplying french fries to consumers, but only a few to restaurants/catering companies.

**Question 2 (Cournot and Stackelberg model):**

In class we analyzed the Cournot and Stackelberg model when their cost structure was symmetric. Let us now consider what happens if we introduce a cost advantage for Boeing relative to Airbus. Assume the following:

Market demand is our standard one  $P = 100 - (q_A + q_B)$

Cost function for Boeing:  $C(q_B) = 10q_B$

Cost function for Airbus:  $C(q_A) = 20q_A$

(a) Assume that the two act according to the Cournot model, i.e. they set quantities. Derive the optimal output for each firm and the resulting market price. Be careful with your algebra: the firms are no longer symmetric!

(b) Suppose now Boeing is the Stackelberg leader. What are the optimal output for the two firms and the market price under this assumption?

(c) How do the two results compare to the ones we obtained in class (symmetric costs)?

### Question 3 (Bertrand model)

Suppose two firms in the market face the market demand curve:  $P = \frac{1000}{Q}$ . Both firms have the following cost function  $C(q) = 20q$ .

(a) What is the Bertrand equilibrium output for this firm? What is the total amount supplied ( $Q$ )? What about the market price?

(b) Suppose now that the first firm has the following cost structure  $C(q_1) = 20q_1$ , whereas the second firm has  $C(q_2) = 10q_2$ . What about the market price and output now? How does the situation differ from the monopoly model?

### Question 4 (Endogenous Market Structure)

Suppose the market demand for pharmaceutical drugs is given as  $Q = S(1 - \frac{P}{k})$  where  $S$  is a measure of market size and  $k$  a measure of the steepness of the demand function. Also assume that all firms in the market face the same cost structure  $C(q) = 0$ . Costs of entry are  $F$ .

(a) Calculate market price and firm profits under both the Cournot and Cartel model.

(b) What is the equilibrium number of firms in the two markets? How does the number depend on the parameters  $F, S$  and  $k$ ? Is one number always bigger than the other?

(c) Suppose recent advances in basic research (often done in universities) opens the possibility to develop drugs for previously incurable diseases (AIDS, Alzheimer). What would happen to the number of firms in the market? Why?