

**Problem Set #1**  
(due April, 6 2001)

**Question 1 (Review of Monopoly)**

"Smoky Mountain" is a tobacco company. It faces the following inverse market demand function:  $P = 100 - 1.5Q$ . Its cost function is given as:  $C(Q) = 10Q + F$  where  $F$  stands for fixed costs.

- Derive the monopoly price, quantity and profits for "Smoky Mountain".
- Calculate the elasticity of demand at the monopoly price and compare it to the elasticity at the competitive market price level. Which one is more elastic?
- In class, we talked about the concept of market power, the ability of the monopolist to charge a price above marginal cost,  $p > MC$ . A convenient measure of market power is the markup formula (also called the *Lerner index*):  $L = \frac{p - MC}{p}$ . I also said that the market power of the monopolist depends crucially on the market elasticity of demand. How are the two concepts related? (*Hint*: use the definition of the Lerner index and your pricing formula from class)
- Some states have higher tax rates on cigarettes than others. An empirical study of pricing in the cigarette industry found that those states with higher tax rates have indeed higher prices, but that this price difference is less than the difference in tax rates. The authors concluded that this is evidence of monopoly pricing behavior in the industry. Assuming that average costs are constant and equal to marginal costs and that market demand is linear, show graphically that these observations are not consistent with competitive pricing but are consistent with monopoly pricing behavior.

**Question 2 (Dominant Firm)**

Take the market for Personal Computers in the early stages of development (1970s and 1980s). IBM was the dominant firm in this market, but there also existed several fringe firms (called the "competitive fringe"). In class, we studied the case where the dominant firm chooses the market price. Here, we will analyze a model where the firms are setting quantities (how many PC's to produce) instead. The market demand function is:  $P = 100 - q$ . The cost function of the dominant firm is:  $C(q_{DF}) = 25q_{DF} + \frac{1}{3}q_{DF}^2$  and the supply function of the fringe firms is given as:  $P = 25 + 2q_{DF}$

- Obtain the residual demand function for IBM. Draw a graph with the market demand, the residual demand and the fringe supply function.
- Solve the optimization problem of IBM. That is, what is the optimal quantity  $q_{DF}^D$ . What is the fringe supply and the equilibrium market demand. How much profit does IBM firm make, how much the fringe combined?
- What do you think is going to happen to this market over time? (*Hint*: think about the fringe profit and the two forces in competition)
- Suppose now that for some reason the supply of the competitive fringe doubled. Thus the supply curve is now  $P = 25 + q_{DF}$ . What is now the residual demand curve? What about the optimal output of IBM?
- If you think about (c) and (d) together, what do they imply about the market share (defined as  $\frac{q_{DF}}{Q}$ ) of IBM over time? (*Hint*: What is the market share of IBM in PC manufacturing today?)

**Question 3 (Cartel)**

Answer TRUE, FALSE or UNCERTAIN and explain your reasoning.

(a) Price wars are more likely to happen during periods of high demand because the gains from cheating are higher.

(b) Internet retailer "PC.com" runs an advertising campaign promising its customers the best prices on the web. Its slogan "We will not be undersold" implies that the company is a tough competitor of other computer retailers.

**Question 4 (OPEC)**

OPEC is often cited as being the prototype of a cartel. This question asks you to think about the arguments made in favor or against this proposition. Read the article about OPEC on my webpage: <http://home.uchicago.edu/~cgathman/Teaching/Econ280>. Answer the following questions:

(a) Which factors mentioned in the article would help OPEC to sustain an oil cartel and what circumstances make it less likely?

(b) What arguments in the text speak against the common notion that OPEC has been a cartel?

(c) What are the main points supporting the alternative stories we discussed in class? Which of the three stories do you believe the most?

Keep your answer short and precise!