

**Problem Set #5**

(due May 25, 2001)

**Question 1 (Consumer Search)**

(a) Determine the equilibrium prices, quantities, and number of high- and low-price stores in the tourist-and-native model if the market demand function is  $Q = a - bp$ , where  $a, b > 0$

(b) It is often argued that the Internet reduces search costs in a market. A second empirical fact is that more and more people which are not computer wizards start using the internet. Use the Tourist- and Native model to explain the effect of these two empirical phenomena on prices for online goods like books. Do they necessarily go in the same direction?

**Question 2 (Advertising)**

Suppose we have a monopoly facing the following general demand function:  $Q = Q(P, A)$  where  $P$  is the monopoly price and  $A$  the amount of advertising she chooses. Advertising increases the demand for the product sold by the monopolist ( $\frac{\partial Q}{\partial A} > 0$ ) but the effect diminishes the more advertising she chooses ( $\frac{\partial^2 Q}{\partial A^2} < 0$ ). Suppose that the cost function facing the monopolist is given as:  $C(Q, A) = C(Q) + A$

(a) Write down the maximization problem for the monopolist and derive the first-order condition for price and level of advertising expenditures.

(b) Rewrite the first-order condition for advertising as a relationship between the markup, the elasticity of demand with respect to advertising (ie by how much demand changes with a 1% increase in advertising) and the advertising to sales ratio  $\frac{A}{PQ}$ . How does the level of advertising vary with the elasticity of demand for advertising?

(c) Use the optimal pricing rule of the monopolist to derive a relationship between the advertising to sales ratio and the elasticities of demand with respect to advertising and with respect to price.

(d) According to your analysis, how much advertising do you expect in a monopoly market where there are close substitutes?

(e) Does this model explain why advertising in competitive markets is often low?

### Question 3 (Innovation)

Consider an industry with  $n$  firms facing a linear demand function of the form:  $P = a - bQ$ . Each firm  $i$  faces the same cost function:  $C(q_i) = \bar{c}q_i$ . Assume the firms engage in Cournot competition.

(a) Assume there is a drastic innovation reducing the marginal cost of the innovator to  $c$ . Remember what a drastic innovation meant: the innovator drives everybody else out of the market, because the monopoly price with the new marginal costs is lower than the competitive price at the old cost:  $p^M(c) < \bar{c}$ . What is the (one-period) value of this drastic innovation for the innovator?

(b) How does the value of innovation changes with the number of firms in the market before the innovation? Derive the relationship and explain.

(c) Suppose now we had a monopoly facing the same demand curve. Again, an innovation reduces the cost of production from  $\bar{c}$  to  $c$ . What is the (one-period) value of the innovation for the monopolist? Compare your result to (b) and explain.

### Question 4 (Innovation)

Read the article "The Knowledge Monopolies" (The Economist: April 8, 2000) which you can download from my webpage. Answer the following questions:

(a) In which sense did the government change its perspective on the patent system and what are the principal (theoretical) forces at work?

(b) According to the article, why have patents become more important in recent years?

(c) Do you expect this patenting trend to continue? Why or why not?

### Question 5 (Innovation and the Patent System)

What are the implications of the following on the incentive to innovate? Discuss.

(a) the government imposes a ceiling on the price an inventor can charge for its new product.

(b) an increase in the length of the patent term.

(c) a requirement that a firm (the licensee) that licenses a technology from an innovator (the licensor) must allow the licensor to use any further improvements it makes to the production technology.