ECON501 Advanced Microeconomic Theory 1
Fall Semester 2007
Problem Set 8

The due date for this problem set is Wednesday December 5.

1. Farmers produce corn using land and labour. The labour cost to produce q bushels of corn is $c(q) = q^2$. There are fifty identical farms currently in operation which all behave competitively.

   (a) What is the individual farmer's supply curve for corn?

   (b) What is the market supply curve for corn?

   (c) Suppose the demand for corn is

   $$x\,(p) = 200 - 50p$$

   What is the equilibrium price and quantity sold?

   (d) What rental cost for a farm's land would make your answer from (c) a long run equilibrium?

   (e) Suppose now that the rental cost for a farm's land was 1. What would be the long-run equilibrium number of farms producing corn?

2. Suppose there is an industry where there are potentially a large number of identical firms that may enter each with a cost function

   $$c\,(q) = q^2/2 + 50.$$

   The demand for the product in the industry is

   $$x\,(p) = 30 - p.$$

   (a) What is the supply curve of an individual firm?

   (b) If firms behave competitively (that is, as price-takers), what is the long run equilibrium number of firms, price and quantity traded in this market?

   (c) If there were J firms who acted as Cournot competitors, what would be the (symmetric) Nash equilibrium quantity decision of each firm, and hence what would be the equilibrium profit each firm would earn? (For the purposes of this part, assume the '50' in the cost function is a sunk cost.)

(d) Recalling that there are a large number of identical firms who may enter this industry, work out the pure-strategy (subgame perfect) Nash equilibrium outcome of the two stage game where in the first stage firms simultaneously decide whether to enter the industry (and incur the fixed cost 50) and after observing the entry decision of their competitors, those firms who have incurred the fixed cost simultaneously decide their quantities of production. (HINT: Your answer to part (c) provides the equilibrium outcome for the second stage if J firms have chosen to enter in the first stage.) How does aggregate welfare in this equilibrium compare with the perfectly competitive outcome computed in part (b)? In particular, are there too many or too few firms operating? Provide some economic intuition for your answer.

3. Lled Corporation has a world monopoly on the production of personal computers. It can make two kinds of computers, low-end and high-end. There are two types of prospective buyers: casual users and intensive users. The casual users comprise a fraction, λ, of the population of prospective buyers while the remaining proportion, $(1 - \lambda)$, are intensive users.

The costs of production of the two kinds of machines, and the benefits gained from the two types of prospective buyers, are given in the following table

		COST	BENEFIT FOR TYPE	
			Casual	Intensive
PC TYPE	Low-end	1	4	5
	High-end	3	5	8

Each type of buyer calculates the net payoff (benefit minus price) she would get from each type of machine, and buys the type that would give the higher net payoff provided this is nonnegative. If both types give equally nonnegative net payoffs for a buyer, she goes for the high end; if both types have negative net payoff for a buyer, she does not purchase. Lled wants to maximize its expected profits.

(a) If Lled were ominiscient, then knowing the type of a prospective customer, the company would could offer to sell her just one type of machine at a stated price, on a take-it-or-leave-it basis. What kind of machine would Lled offer, and at what price, to what kind of buyer?

In fact, Lled does not know the type of any particular buyer. It just makes its 'catalog' available for all buyers to choose from.

(b) First, suppose the company produces just the low-end machines and sells them for price p_L. What value of p_L will maximize its profit? How does the answer depend on λ, the proportion of casual users in the population?

(c) Next, suppose Lled produces just the high-end machines and sells them for price p_H. What value of p_H will maximize its profit, and how does that depend on λ?

(d) Finally, suppose the company produces both types of machines, selling the low-end ones for price p_L and the high-end ones for price p_H. What are the self-selection constraints on p_L and p_H that the company must satisfy if it wants the casual users to buy the low-end machines and the intensive users to buy the high-end ones? What is the company's profit from this policy? What values of p_L and p_H will maximize the profit? How does the answer depend on λ?

(e) Putting all of this together, what production and pricing policy should the company pursue? How does the answer depend on λ?