ECON 301, Professor Hogendorn

Problem Set 7

1. *12firms.* There is a firm with production function

$$q = f(L,K) = L^{1/2} + K^{1/2}$$

This firm is initially stuck in the short run with $\overline{K} = 16$ which cannot be changed. The wage is $w = 3$ and the price of capital is $r = 4$.

   (a) Find the short run marginal cost curve and the short-run supply curve.

   (b) If there are 12 firms, and if market demand is $q(p) = 96 - p$, what is the short-run market equilibrium price?

   (c) What is the short-run average total cost? Is this firm making a loss, breaking even, or making a super-normal profit? Illustrate on a two-panel graph, one panel showing the market, the other showing the cost curves of an individual firm.

2. *Coke.* Suppose that all around the world, there are small towns in which the price elasticity of demand for Coca-cola is constant at -1.2. Each of these towns is served by a monopoly Coke distributor. However, the technology for distributing Coke varies widely: huge bottling plants and 18-wheeler truck delivery in the USA, local bottlers and van delivery in Japan, delivery by pack mule to isolated parts of Bolivia, etc.

   (a) What is the Lerner Index on Coke in these markets?

   (b) Let the production function be $f(K) = \beta K^2$, where β varies from place to place, and let the price of capital be 20. How

does the price of Coke vary with β? (This is pretty tricky. Note that there is a constant elasticity demand, check review problem *Minus2*.)

3. *Nissan*. Suppose there is a local Nissan dealer that has a monopoly in selling Nissans in a particular town. Let it's demand curve be $y = 30 - p$, where p is the price in thousands that it charges per car. The dealer has to pay Nissan w per car. It costs Nissan \$5 (thousand) to produce each car.

   (a) What is the profit-mazimizing price and quantity for the dealer? What is its profit?

   (b) What is Nissan's inverse demand curve for cars from this dealer?

   (c) If Nissan behaves as a monopolist, what quantity of cars does it produce. What price does it charge? How much is its profit? How much is the dealer's profit?

   (d) Suppose Nissan operated the dealership directly. How many cars would it sell? What would its profit be?

Review problems only, not to turn in:

4. *Minus2*. Suppose the demand curve for a good is:

$$x(p) = 1000p^{-2}$$

   There is a monopoly which produces this good, and it has constant marginal cost of \$2 per unit.

   (a) What is the monopoly optimal price, quantity, and profit?

   (b) What is the deadweight loss of this monopoly?

Answers to Review Problems:

4. *Minus2_a.*

   (a) This is easy because we have a constant elasticity demand curve with $\epsilon = -2$ and a constant marginal cost of \$2. Thus, the Lerner Index form of the monopoly's first order condition tells us that

   $$\frac{p-2}{p} = -\frac{1}{-2} \Rightarrow p^* = 4$$

   The demand curve tells us that $x(4) = 1000Ö4^{-2} = 62.5$. The constant MC is the same as the AC, so there is a profit of \$2 per unit, or a total profit of 125.

   (b) At $p^* = MC = 2$, the monopoly quantity is

   $$x(2) = 1000Ö2^{-2} = 250$$

   The deadweight loss is the area between the price of 2 and 4, but not including the monopoly profit:

   $$\int_2^4 1000p^{-2}dp - 125 = -1000Ö4^{-1} + 1000Ö2^{-1} - 125 = \$125$$

   This is represented by areas A and B in the following figure: