Introduction to Industrial Organization Fall 2014
Homework 1

1. Suppose a perfectly competitive firm has a cost function $c(q) = 5q$ and faces a price $p = 4$. What quantity should it produce? What if $c(q) = 2.5q^2$? What are its short run profits in both scenarios?

2. Suppose the cost of producing q cars is given by $c(q) = 7500 + 2000q - 10q^2$

   a. What is the variable cost of producing 10 cars?

   b. What is the marginal cost of producing the $10th$ car?
   c. Solve for $AC\ (q)$ and $AVC\ (q)$.
   d. Is $AVC\ (q)$ increasing or decreasing in q?
   e. Is $AC\ (q)$ increasing or decreasing in q?

3. Suppose a competitive market consists of identical firms with a constant long-run marginal cost of $10. There are no fixed costs in the short run or long run. Suppose the demand curve is given by $Q(P) = 1000 - P$.

   a. What is the short run perfectly competitive equilibrium with 100 identical firms?

   b. What are the price and quantity consumed in the long run competitive equilibrium?

   c. Suppose one new firm enters that is different from existing firms. The new firm has a constant marginal cost of $9 and no fixed costs, but can only produce 10 or fewer units of output. What are the price and quantity consumed in the new long-run competitive equilibrium?

   d. Does the existence of the new, more efficient firm increase consumer surplus? Explain.

   e. Are the economic profits of the new firm inconsistent with a long-run competitive equilibrium?

   f. How much profit do the less efficient firms earn?

4. Consider the following values of the price elasticity of demand. $Cigarettes = -0.5$,
$US\ luxury\ cars\ in\ the\ United\ States = -1.9$,
$Foreign\ luxury\ cars\ in\ the\ United\ States = -2.8$.

   a. Based on these values, provide an estimate of the impact on revenues from a 10 percent increase in the price of each of the above three products.

   b. Does it surprise you that demand for cigarettes is less elastic than demand for domestic cars which is less elastic than demand for foreign cars?

5. After spending 10 years and $1.5 billion, you have finally gotten the Food and Drug Administration's approval to sell your patented wonder drug which reduces the aches and pains associated with aging. Market research indicates that the elasticity of demand for your drug is -1.25 and you estimate the marginal cost of manufacturing and selling on additional dose to be $1.

a. What is the profit maximizing price per dose of your drug?

b. Would you expect the elasticity of demand you face to rise or fall when your patent expires?

6. "The degree of monopoly power is limited solely by the elasticity of demand." Comment on this statement.

7. Find the optimal monopoly price, the elasticity of demand at the optimal price, and the output distortion with respect to the perfectly competitive levels for the following cost and demand functions:

   a. $Q(p) = a - p$ and $C(Q) = cQ$

   b. $Q(p) = p^{-a}$ and $C(Q) = cQ$. Note that the demand function given a constant elasticity demand function.

8. The production of electricity can be carried out with the cost function $C(Q) = F + cQ$ with a big F. We observe two markets, A and B, where electricity is produced. Demand is identical in these two markets. Each industry is served by a monopolist that sets the monopoly price and makes monopoly profit. Observers have noticed however, that the monopolist in market A produces at a marginal cost of 1 but the monopolist of market B produces at a marginal cost of 2.

   a. Explain why the electric industry is a natural monopoly.

   b. Draw the demand, AC, and MC curves in both markets. On these graphs indicate the welfare losses due to "allocative inefficiency" (i.e. the fact that too little electricity is produced in monopoly markets)

   c. Suppose that $1 marginal costs are perfectly attainable in market B, but the monopolist's lobbying efforts leave it protected from entry. How much would welfare increase if the government granted a low-cost electricity producer monopoly rights in market B? This surplus change is due to "productive inefficiency" in B.

   d. Suppose now that the demand functions in A and B have constant elasticity equal to -2. Compare the prices of electricity that will emerge in markets A and B.

   e. Suppose the government is thinking of subsidizing competition in market A. Two firms will operate as perfect competitors. If resulting profits are negative, the government will subsidize each firm by an amount F so that profits are zero. Show that average costs are higher under perfect competition than under monopoly. What subsidies must the government pay the electricity producers to guarantee zero profits? How does surplus in A change relative to the monopoly case?