# Homework 5

**Problem 1** The US Postal Service (USPS) has a government-sanctioned monopoly on first-class mail. In early 2008, it charged 41 cents for a stamp, which is probably not the profit-maximizing price, as the USPS's goal is, allegedly, to break even rather than to turn a profit. In 2007, the USPS allowed stamps.com to sell a sheet of twenty 41 cent stamps with customized photos for $18.99 (that's 94.95 cents/stamp, or a 232% markup). stamps.com keeps the extra beyond the 41 cents it pays USPS.

What is stamps.com's Lerner index? If stamps.com is a profit-maximizing monopolist, what elasticity of demand does it face for a customized stamp?

The Lerner index is $\frac{94.95-41}{94.95} = .57$. If it is a profit-maximizing monopolist, then $-\frac{1}{\epsilon} = .57$, so $\epsilon = -1.76$

**Problem 2** In 2005, Apple sold its 512MB iPod Shuffle for $99. According to iSuppli, Apple's per-unit cost of manufacturing the shuffle is $45.37. What is Apple's Lerner index? What is the elasticity of demand Apple faces?

Apple's Lerner index is $\frac{99-45.37}{99} = .54$. It's elasticity of demand is $-1.84$

**Problem 3** The demand curve a monopoly faces is $P = 100 - Q$. The firm's cost curve is $c(Q) = 10 + 5Q$ (so $mc = 5$). What is the firm's profit-maximizing quantity and price? What is the firm's profit? What is the value of consumer surplus and deadweight loss? What is this monopolist's Lerner index?

The monopolist maximizes profit by setting $Q = 47.5$ and $P = \$52.50$. Consumer surplus is 1128.125, producer surplus is 2256.25, profit is 2246.25. Deadweight loss is 1128.125. The Lerner index is .904.

**Problem 4** The Albuquerque Isotopes, a minor league baseball team, have a stadium which seats 30,000 people. All seats are identical. The optimal ticket price is $5, yet this results in an average attendance of only 20,000 people.

a. Explain how it can be profitable to have 10,000 empty seats.

Were the Isotopes to fill the stadium, they would have to lower the ticket price from $5. While this would generate additional revenue from the new spectators, it would lose revenue from those who came even when the price was $5.

b. Next week the Isotopes play the Capital City Goofballs, who have offered to buy an unlimited number of tickets at $4 each, to be resold only in Capital City. How many tickets should be sold to Capital City to maximize the Isotopes' profit? 10,000? More than 10,000? Explain.

Capital City's offer raises the marginal cost of selling a ticket to an Albuquerque fan by $4; this is the opportunity cost of the seat given Capital City's offer. Increasing this marginal cost lowers the quantity which should be sold in Albuquerque (draw a picture to convince yourself of this).

c. Given your answer to b, what price should the Isotopes charge their own fans? $4? $5? More?

Given the answer to b., they should charge a price of more than $5 to Albuquerque fans.

**Problem 5** True/false: a monopolist will increase its output if the government institutes a binding price ceiling. Explain why. If the government wants to set a price ceiling which maximizes total surplus, what price should it choose? (Hint: use a graph to help answer this question).

This was answered in the 3/5 lecture.

**Problem 6** There are 10 households in Lake Wobegon, Minnesota, each with a demand for electricity of $Q = 50 - P$. Lake Wobegon Electric's (LWE) cost of producing electricity is $c(Q) = 500 + Q$.

a. If the regulators of LWE want to make sure that there is no deadweight loss in this market, what price will they force LWE to charge? What will output be in this case? Calculate consumer surplus and LWE's profit with that price.

They will impose a price ceiling where marginal cost crosses the demand curve, at $P = \$1$. If LWE produces the demanded quantity of 49 per customer, their profit would be $10 * 1 * 49 - 500 - 49 * 10 = -500$. They would thus need a subsidy of at least \$500 were they to continue to operate at this price. Consumer surplus is $\frac{1}{2} * 49 * 49 = 1200.5$ per consumer, for a total of 12005.

b. If regulators want to ensure that LWE doesn't lose money, what is the lowest price they can impose? Calculate output, consumer surplus, and profit. Is there any deadweight loss?

They will impose a price ceiling where average cost crosses the demand curve. The total demand curve, summed across the 10 customers, is $Q = 500 - 10P$, or $P = 50 - .1Q$, so we need $50 - .1Q = \frac{500}{Q} + 1$, which holds at $Q = 479.57$, $P = \$2.04$. Profit would be 0. Consumer surplus is $\frac{1}{2} * 479.57 * 47.96 = 11500$. Deadweight loss is $\frac{1}{2} * 1.04 * 10.43 = 5.42$.

c. It is suggested that each household be required to pay a fixed amount just to receive any electricity at all, and then a per-unit charge for electricity. Then LWE can break even while charging the price calculated in a. What fixed amount would each household have to pay for the plan to work? Per the answer in a, if each household paid LWE a \$50 fee, LWE could break even charging a price of \$1, with no deadweight loss.