Economics Applications Homework*

1. Suppose a company can produce a product for \$500 a piece. They have 20 potential customers, each interested in buying a single item. There are 6 that are willing to pay \$500, 3 willing to pay \$750, 4 willing to pay \$900, 5 willing to pay \$1200, and 2 willing to pay \$1600.

   (a) Out of the 5 prices listed above, what (fixed) price should the company charge to maximize profits?

   (b) What is the consumer surplus at this price?

2. The demand function for a certain commodity is $p_d(x) = 5 - \frac{1}{10}x$.

   (a) Find the consumer surplus when the sales level is 30.

   (b) Illustrate by drawing the demand curve and identifying the consumer surplus as an area.

3. The **supply function** $p_s(x)$ for a commodity gives the relation between the selling price and the number of units that manufacturers will produce at that price. For a higher price, manufacturers will produce more units, so p_s is an increasing function of x. Let X be the amount of the commodity currently produced, and let $P = p_s(X)$ be the current price. Some producers would be willing to make and sell the commodity for a lower selling price and are therefore receiving more than their minimal price. The excess is called **producer surplus**. An argument similar to that for consumer surplus shows that the surplus is given by the integral

$$\int_0^X [P - p_s(x)]\, dx.$$

   (a) Calculate the producer surplus for the supply function $p_s(x) = 3 + 0.01x^2$ at the sales level $X = 10$. Illustrate by drawing the supply curve and identify the producer surplus as an area.

   (b) If a supply curve is modeled by the equation $p = 200 + 0.2x^{3/2}$, find the producer surplus when the selling price is \$400.

4. For a given commodity and pure competition, the number of units produced and the price per unit are determined as the coordinates of the point of intersection of the supply and demand curves. Given the demand curve $p_d = 50 - \frac{x}{20}$, and the supply curve $p_s = 20 + \frac{x}{10}$,

   (a) Find the consumer surplus.

   (b) Find the producer surplus.

   (c) Illustrate by sketching the supply and demand curves and identifying the surpluses as areas.

5. Assume that a producer finds that if he charges \$90 he gets 10 buyers, if he charges \$65.60 he gets 12 buyers, and if he charges \$27.50 he gets 15 buyers. Assuming a quadratic demand curve,

   (a) Find the demand curve $p_d(x)$. Make sure to show your work.

   (b) For what values of x does this curve make sense?

   (c) What price should he charge to maximize revenue?

   (d) What is the consumer surplus at this price?

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