

Sample problems for Chapter 2:

Problem 1:

The demand for tickets to the Daytona 500 NASCAR event is given by the equation $Q_d = 350,000 - 800P$. The supply of tickets to the event is given by the capacity of the Daytona track, which is 150,000.

- What is the equilibrium price of tickets to the event? And draw the demand and supply graphs. (Label your graph)
- What is the price elasticity of demand at the equilibrium price?
- What is the price elasticity of supply at the equilibrium price?

Problem 2:

Suppose that supply and demand curves for a good are described by the following equations:

$$Q_s = 10 + 1/2P$$

$$Q_d = 100 - 2P$$

where P is the price in dollars.

- Solve for the equilibrium price and quantity.
- Calculate the point of elasticity of demand at the equilibrium price.
- Starting at the equilibrium price, calculate the arc elasticity of demand for a \$1.00 increase in price and a \$ 1 decrease in price. Are your answers different? Why?

Solutions :

Problem 1:

- a. Consumers are willing to pay $P = 200,00/800 = \$250$ per ticket.
- b. The price elasticity of demand at \$250 is $E_D = P/Q \Delta Q/\Delta P = 250/150,000 (- 800) = - 1.33$
- c. The price elasticity of supply is $E_S = (P/Q)(\Delta Q/\Delta P) = 250/150,000*0 = 0$.

Problem 2:

1. The equilibrium point is

$$\begin{aligned}Q_s &= Q_D \\10 + 0.5P &= 100 - 2P \\2.5P &= 90 \\P &= 36 \text{ and } Q = 28\end{aligned}$$

2. Elasticity of demand and supply are:

$$\begin{aligned}E_D &= \frac{\Delta Q}{\Delta P} \frac{P}{Q} = -2 \frac{36}{28} = -2.57 \\E_S &= \frac{\Delta Q}{\Delta P} \frac{P}{Q} = 0.5 \frac{36}{28} = 0.64\end{aligned}$$

3. First we have to find the quantities for each one of the prices:

$$\begin{aligned}Q_{p=37} &= 100 - 2 \times (36 + 1) = 26 \\Q_{p=35} &= 100 - 2 \times (36 - 1) = 30\end{aligned}$$

$$\begin{aligned}\bar{E}_D &= \frac{\Delta Q}{\Delta P} \frac{\bar{P}}{\bar{Q}} = -2 \frac{(36+35)/2}{(28+30)/2} = -2.44 \\ \bar{E}_D &= \frac{\Delta Q}{\Delta P} \frac{\bar{P}}{\bar{Q}} = -2 \frac{(36+37)/2}{(28+26)/2} = -2.70\end{aligned}$$

The effect of an increase in the price is not the same as the effect of a decrease in the price on the quantities.

Problem 3:

Midcontinent Plastics makes 80 fiberglass truck hoods per day for large truck manufacturers. Each hood sells for \$500.00. Midcontinent sells all of its product to the large truck manufacturers. Suppose the price elasticity of demand for hoods is 0.4 and the price elasticity of supply is 1.5. (**Hint: price elasticity of demand is always negative**)

1. Compute the slope and intercept coefficients for the linear supply.
2. Compute the slope and intercept coefficients for demand equations.
3. If the local county government imposed a per unit tax of \$25.00 per hood manufactured,

what would be the new equilibrium price of hoods to the truck manufacturer?

4. Would a per unit tax on hoods change the revenue received by Midcontinent?

Solutions

Equilibrium price is: $P^* = \$500$ Equilibrium quantity is: $Q^* = 80$ hoods per day

$$E_d = -0.40 \text{ and } E_s = 1.5$$

$$a. \text{ Demand: } Q_d = a_0 + a_1P \quad \text{Supply: } Q_s = b_0 + b_1P$$

$$\text{Use: } E = PQ \times \Delta Q / \Delta P$$

to compute a_1 and b_1 .

$$-0.4 = 500/80 * a_1$$

$$1.5 = 500/80 * b_1$$

$$a_1 = -0.064 \quad b_1 = 0.24$$

Solve for a_0 and b_0 :

$$Q_d = a_0 + a_1P \quad Q_s = b_0 + b_1P$$

$$80 = a_0 + -0.064(500) \quad 80 = b_0 + 0.24(500)$$

$$a_0 = 112 \quad b_0 = -40$$

$$Q_d = 112 - 0.064P \quad Q_s = -40 + 0.24P$$

b. The tax represents a price increase to the purchaser regardless of the current price. Thus, the supply curve will be adjusted vertically upward by \$25.

$$Q_s = -40 + 0.24P \text{ or}$$

$$P = 166.67 + 4.17 Q_s, \text{ then}$$

$$P_t = P + \$25 = 166.67 + 25 + 4.17Q_s$$

$$P_t = 191.67 + 4.17Q_s \text{ or}$$

$$Q_s = -45.96 + 0.24P$$

The new equilibrium price will be:

$$\text{New Supply} = \text{Demand}$$

$$Q_s = -45.96 + 0.24P = 112 - 0.064P = Q_d$$

$$\text{Solving yields } P = \$519.60 \text{ per truck hood}$$

c. Since the new selling price in (c) is \$519.60 and the tax is \$25 per hood, Midcontinent would receive only \$494.6 per hood. As quantity sold has fallen too, revenues would fall.