

## Math Skills for Intermediate Microeconomics

1) Given a demand function:  $Q_{dx} = 198,000 - 20,000 P_x$  and

a supply function:  $Q_{sx} = -2000 + 20,000P_x$

a. Find the equilibrium price that will be charged for the good. (Show work in an organized fashion)

$$Q_{dx} = 198,000 - 20,000P_x = -2,000 + 20,000P_x = Q_{sx}$$

$$200,000 - 20,000P_x = 20,000P_x$$

$$40,000P_x = 200,000$$

$$P_x = \frac{200,000}{40,000} = 5$$

Answer  **$P_x = \$5$**

b. Find the equilibrium quantity of the good produced (Show work in an organized fashion)

**Substitute Equilibrium price into demand or supply**

$$Q_{dx} = 198,000 - 20,000(5) = 98,000 \text{ units}$$

or

$$Q_{sx} = -2,000 + 20,000(5) = 98,000 \text{ units}$$

Answer  **$Q = 98,000 \text{ units}$**

2) Given the demand function:  $Q_{dx} = 198,000 - 20,000 P_x$ , Show the Total Revenue Function Where  $TR = f(Q)$ .

Express  $P_x = f(Q_x)$

$$Q_{dx} = 198,000 - 20,000P_x$$

$$Q_{dx} - 198,000 = -20,000P_x$$

$$P_x = \frac{(-198,000)}{(-20,000)} + \frac{1}{(-20,000)} Q_x$$

$$P_x = 9.9 - .00005Q_x$$

$$TR = PQ$$

$$P = 9.9 - .00005Q$$

$$TR = (9.9 - .00005Q)Q$$

$$TR = 9.9Q - .00005Q^2$$

Answer  **$TR = 9.9Q - .00005Q^2$**

3) Given the Demand function:  $P_x = 80 - .2Q_x$ , find the output level that will maximize total revenue.

$$\text{Max TR where, } \frac{dTR}{dQ} = 0$$

$$TR = 80Q_x - .2Q_x^2$$

$$\frac{dTR}{dQ_x} = 80 - .4Q_x = 0$$

$$Q_x = \frac{80}{.4} = 200 \text{ units}$$

Answer  **$Q_x = 200 \text{ Units}$**

4) Given the demand function:  $P_x = 80 - .2Q_x$ , find the price that would be charged to maximize total revenue.

$$P_x = 80 - .2Q_x$$

$$P_x = 80 - .2(200) = 40$$

Answer  **$P_x = \$40$**