

**Study Question – Profit, question 3**

(Answers may not be whole numbers. Assume that a firm may sell non-integer amounts of product.)

1. In a market, demand is  $P = 1,000,000 - Q_d$   
MC =  $2Q_s$

If possible, calculate equilibrium price and quantity, and deadweight loss, under the following conditions:

- a) the market is perfectly competitive
  
- b) monopoly with no price discrimination

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a) the market is perfectly competitive

$$p = MC \quad 1,000,000 - Q = 2Q \quad 3Q = 1,000,000 \quad Q = 333,333.33$$

$$P = 1,000,000 - 333,333.33 = \$666,666.67 \quad \text{deadweight loss} = 0$$

b) monopoly with no price discrimination

$$MR = 1,000,000 - 2Q$$

$$MR = MC \quad 1,000,000 - 2Q = 2Q \quad 4Q = 1,000,000 \quad Q = 250,000$$

$$P = 1,000,000 - 250,000 = 750,000$$

deadweight loss:

note that  $MC = 2(250,000) = 500,000$  at profit maximizing Q

$$\begin{aligned} \text{deadweight loss} &= .5(P - MC)(Q_{\text{perfect comp}} - Q_{\text{monopoly}}) = .5(750,000 - 500,000)(333,333.33 - 250,000) \\ &= 10,416,666,250 \end{aligned}$$