

Study Question -- Pricing

1. A firm has average cost equation $AC = 5Q$ and demand equation for its product $Q = 1000 - .25P$.

- a) Calculate profit-maximizing quantity and price assuming no price discrimination.
- b) Calculate profit-maximizing quantity and lowest price charged assuming first degree price discrimination.

2. A firm has total cost equation $C = 10Q$ and two groups of buyers for its product.

Group A has demand $Q_a = 1000 - P$

Group B has demand $Q_b = 800 - 2P$

$(Q = Q_a + Q_b)$

- a) Calculate profit-maximizing quantity and price assuming no price discrimination.
- b) Calculate profit-maximizing quantity and price assuming 3rd degree price discrimination.

$$1. \text{ total cost} = AC \times Q = 5Q^2$$

$$\text{marginal cost} = dTC/dQ = 10Q$$

$$a) \text{ Rearrange demand equation: } P = 4000 - 4Q$$

$$\text{MR is twice as steep with same constant term: } MR = 4000 - 8Q$$

$$\text{Set MR} = \text{MC: } 4000 - 8Q = 10Q \rightarrow Q = 222.222222222$$

$$P = 4000 - 4(222.2222222) = \$3111.11111$$

$$b) \text{ MR equation is demand equation: } MR = 4000 - 4Q$$

$$\text{Set MR} = \text{MC: } 4000 - 4Q = 10Q \rightarrow Q = 285.714285$$

$$\text{Lowest price charged is where } P = \text{MC} \rightarrow P_{\text{lowest}} = 10(285.714285) = \$2857.122857$$

$$2. a) \text{ Sum demands of A and B: } Q = 1800 - 3P$$

$$\text{rearrange demand equation: } P = 600 - (1/3)Q$$

$$\text{MR equation is twice as steep: } MR = 600 - (2/3)Q$$

$$\text{Set MR} = \text{MC} \quad 600 - (2/3)Q = 10 \rightarrow Q = 885$$

$$P = 600 - (1/3)885 = \$305$$

b)

$$\text{Rearrange group A demand curve: } P_a = 1000 - Q_a$$

$$\text{MR}_a \text{ equation is twice as steep: } \text{MR}_a = 1000 - 2Q_a$$

$$\text{Set MR} = \text{MC} \quad 1000 - 2Q_a = 10 \rightarrow Q_a = 495$$

$$P_a = 1000 - 495 = \$505$$

$$\text{Rearrange group B demand curve: } P_b = 400 - .5Q_b$$

$$\text{MR equation is twice as steep: } \text{MR}_b = 400 - Q_b$$

$$\text{Set MR} = \text{MC} \quad 400 - Q_b = 10 \rightarrow Q_b = 390$$

$$P_a = 400 - .5(390) = \$205$$