

Question 3.

3a Market Demand:

$$Q_d = 110 - 10p$$

Large firm marginal cost = \$5

Competitive fringe. Total Marginal cost

$$MC = (5 + 100q) 200$$

Supply Curve: $p = MC$

$$50 \quad P = 5 + 100q$$

$$\cancel{50} \quad 100q = P - 5$$

$$q = \frac{P}{100} - \frac{1}{20}$$

q is output for single fridge.

Total output for all 200 fringe

$$Q_f = \left(\frac{P}{100} - \frac{1}{20} \right) 200$$

$$\underline{\underline{Q_f = 2P - 10}} \quad (\text{Supply curve})$$

Residual Demand

Market Demand

$$Q_d = Q_r + Q_f$$

Q_r is output of large firm.

$$Q_r = Q_d - Q_f$$

$$= 110 - 10p - (2p - 10)$$

$$= 110 - 10p + 10 - 2p$$

$$Q_r = 120 - 12p$$

So $Q_r = 120 - 12p$ is the residual demand

b $Q_r = 120 - 12p$

$$12P = 120 - Q_r$$

$$P = 10 - \frac{Q_r}{12}$$

$$R = 10Q_r - \frac{1}{12}Q_r^2 \quad (\text{Revenue})$$

$$MR = \frac{dR}{dQ_r} = 10 - \frac{1}{6}Q_r$$

Profit Maximizing is

$$MR = MC$$

$$10 - \frac{1}{6}Q_r = 5$$

$$10 - 5 = \frac{1}{6}Q_r$$

$$5 = \frac{1}{6}Q_r$$

$$Q_r = 30$$

So 30 is profit maximizing output

Resulting Market price

$$P = 10 - \frac{Q_r}{12}$$

$$P = 10 - \frac{30}{12} = \$7.5$$

C Substituting $P=7.5$ in fringe Supply curve

$$\begin{aligned}Q_f &= 2P - 10 \\&= 2(7.5) - 10 \\&= 5\end{aligned}$$

$$Q_f = 5$$

Competitive fringe produces 5 units

$$\text{Fringe Market Share} = \frac{5}{5+30} = \frac{1}{7} \text{ or } 0.14$$

$$\text{Dominant firm Market Share} = \frac{30}{30+5} = \frac{6}{7} \text{ or } 0.86$$