

Answers to ... (problems)

$$\textcircled{1} \quad TC = 125 + 100Q + 25Q^2$$

$$P = 1,100$$

$$\text{Max profits, } Q = \frac{20}{\pi} = \underline{9,875}$$

Need MC and MR:

$$TR = 1,100Q$$

$$MR = 1,100$$

$$TC = 125 + 100Q + 25Q^2$$

$$MC = 100 + 50Q$$

$$MR = MC$$

$$1,100 = 100 + 50Q$$

$$1,000 = 50Q$$

$$\boxed{20 = Q^*}$$

$$\pi = 1,100Q - (125 + 100Q + 25Q^2)$$

$$= 1,100Q - 125 - 100Q - 25Q^2$$

$$= -125 + 1,000Q - 25Q^2$$

$$M\pi = 1,100 - 50Q = 0$$

$$1,000 = 50Q$$

$$20 = Q$$

$$\pi = -125 + 1,000Q - 25Q^2$$

$$= -125 + 20,000 - 10,000$$

$$\pi = \underline{9,875}$$

$$Q_D = 40 - 2P$$

$$TC = 0.5Q^2$$

Max profits -

$$Q^* = \frac{10}{15}$$

Need inverse demand \rightarrow :

$$Q_D = 40 - 2P$$

$$2P = 40 - Q_D$$

$$P = 20 - .5Q_D$$

Need MR and MC

$$TR = (20 - .5Q)Q$$

$$= 20Q - .5Q^2$$

$$MR = 20 - Q$$

$$MC = Q$$

$$20 - Q = Q$$

$$20 = 2Q$$

$$10 = Q$$

$$10 = 40 - 2P$$

$$30 = 2P$$

$$15 = P$$

Need π

$$\pi = 20Q - .5Q^2 - (.5Q^2)$$

$$= 20Q - Q^2$$

$$\pi = 20 - 2Q = 0$$

$$20 = 2Q$$

$$10 = Q$$

$$③ \quad S = 20 + 4A - .05A^2$$

S = Sales
A = adv.

Maximize Sales

$$MS = \frac{\partial S}{\partial A} = 4 - .1A = 0$$

$$40 = A$$

$$④ \quad \pi = -500 + 100Q - Q^2$$

$$\frac{\partial \pi}{\partial Q} = 100 - 2Q = 0$$

$$100 = 2Q$$

$$50 = Q$$

$$⑤ \quad P = 4,500 - .15Q$$

$$C = 1500Q$$

$$P^* = 3,000$$
$$Q^* = 10,000$$

$$TR = 4500Q - .15Q^2$$

$$MR = 4500 - .3Q = 1500 = MC$$

$$3000 = .3Q$$

$$10,000 = Q$$

$$P = 4500 - .15(10,000)$$

$$= 4500 - 1500$$

$$= 3,000$$

Max Revenue

$$4500 - .3Q = Q$$

$$4500 = .3Q$$

$$15000 = Q$$

$$Q_D = 120,000 - 10,000P$$

$$C = 12,000 + 1.5Q$$

$$10,000P = 120,000 - Q$$

$$P = 12 - \frac{1}{10,000}Q$$

$$TR = 12Q - \frac{1}{10,000}Q^2$$

$$\text{MR} = 12 - \frac{1}{5,000}Q = 1.5 = \text{MC}$$

$$10.5 = \frac{1}{5,000}Q$$

$$52,500 = Q$$

$$\begin{array}{l} Q^* = \underline{52,500} \\ P^* = \underline{\$6.75} \\ R_{\max} Q = \underline{60,000} \\ P = \underline{6.0} \end{array}$$

Max Rev

$$TR = 12Q - \frac{1}{10,000}Q^2$$

$$MR = 12 - \frac{1}{5,000}Q = 0$$

$$12 = \frac{1}{5,000}Q$$

$$60,000 = Q$$

marginal Profit = ~~0~~
at max Profit