

Problem 6

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Inverse demand is, $p = -5 + 0.5m - 0.75q$, where m is per capita income. If the cost per unit is constant at \$5, calculate the profit maximizing price as a function of per capita income. How much does the profit maximizing price increase per \$1 increase in per capita income?

$$\begin{aligned}\pi &= (-5 + 0.5m - 0.75q)q - 5q \\ &= -5q + 0.5mq - 0.75q^2 - 5q \\ &\hookrightarrow -10q + 0.5mq - 0.75q^2\end{aligned}$$

$$\frac{d\pi}{dq} = -10 + 0.5m - 1.5q$$

$$0 = -10 + 0.5m - 1.5q$$

$$10 = 0.5m - 1.5q$$

$$10 - 0.5m = -1.5q$$

$$q = -6.66 + 0.33m$$

$$p = -5 + 0.5m - 0.75(-6.66 + 0.33m)$$

$$p = -5 + 0.5m + 5 - 0.25m$$

$$p = 0.25m$$

If it's 1.5m...

$$\begin{aligned}\dots 10 - 1.5m &= -1.5q \\ q &= -\frac{20}{3} + m\end{aligned}$$

$$p = -5 + 1.5m - 0.75\left(-\frac{20}{3} + m\right)$$

$$p = -5 + 1.5m + 5 - 0.75m$$

$$p = 0.75m$$

$$\begin{aligned}p &= 0.75m / 0.25m \\ &= 3\end{aligned}$$

The Price increases by 300% per \$1 increase in per capita income