

Problem 6

Saturday, January 30, 2021 3:31 PM



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?

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

$$\frac{d\pi}{dq} = -10 + 0.5m - 1.5q \rightarrow q^* = \frac{m - 20}{3}$$

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

$$10 = 0.5m - 1.5q$$

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

$$q = -6.66 + 0.33m$$

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

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

$$P = 0.25m$$

~~IF it's 1.5m...~~

~~$$\dots 10 - 1.5m = -1.5q$$~~

~~$$q = -\frac{20}{3} + m$$~~

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

~~$$P = -5 + 1.5m + 5 - 0.75m$$~~

~~$$P = 0.75m$$~~

~~$$P = 0.75m / 0.25m = 3$$~~

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