

Q 6 Answer:

a) With a 20% ad valorem tax the gov't seeks to max:

$$\begin{aligned}\Pi &= TR - TC \\ &= (1 - 0.20)(30 - Q)Q - 4Q \\ \frac{d\Pi}{dQ} &= 0.8(30 - 2Q) - 4 = 0 \\ Q^* &= 12.5 \\ p^* &= 17.5 \\ GR &= t \times Q^* \\ GR &= 43.75\end{aligned}$$

b) A specific tax of t makes monopolist Π :

$$\begin{aligned}\Pi &= TR - TC \\ &= (30 - Q)Q - (4 + t)Q \\ \frac{d\Pi}{dQ} &= 30 - 2Q - 4 - t = 0 \\ Q^* &= 13 - t/2 \\ GR &= t \times Q^* \\ GR &= t(13 - t/2)\end{aligned}$$

c) To get the same revenue

$$\begin{aligned}GR &= t(13 - t/2) = 43.75 \\ 26t - t^2 &= 87.5 \\ t &= 3.7\end{aligned}$$

d) Q with specific tax = 11.15

Q with ad valorem tax = 12.50

Specific tax has a greater distortion.