∂ 9.1 figure it out

Suppose the demand curve is $Q = 12.5 - 0.25P$.

a. What is the marginal revenue curve that corresponds to this demand curve?

b. Calculate marginal revenue when $Q = 6$. Calculate marginal revenue when $Q = 7$.

c. Calculate the marginal revenue curve using calculus and confirm that it is the same as the answer to part (a).

Solution:

a. First, we need to solve for the inverse demand curve by rearranging the demand function so that price is on the left side by itself:

$$Q = 12.5 - 0.25P$$
$$0.25P = 12.5 - Q$$
$$P = 50 - 4Q$$

So, we know that the inverse demand curve is $P = 50 - 4Q$, with $a = 50$ and $b = 4$. Because $MR = a - 2bQ$, we know that $MR = 50 - 8Q$.

b. We can plug these values into our MR equation to solve for marginal revenue:

When $Q = 6$, $MR = 50 - 8(6) = 50 - 48 = 2$.

When $Q = 7$, $MR = 50 - 8(7) = 50 - 56 = -6$.

Note that, as we discussed above, MR falls as Q rises and can even become negative.

c. Marginal revenue is the derivative of the revenue function. Revenue is price times quantity, where price is the inverse demand curve. Rearranging the given demand curve by solving for price as a function of quantity, we see that the inverse demand curve is $P = 50 - 4Q$. Therefore,

$$TR = P \times Q = (50 - 4Q)Q = 50Q - 4Q^2$$
$$MR = \frac{dR}{dQ} = 50 - 8Q$$

This is the same as the answer to part (a).