

Q. 13

$$p = f(x)$$

* From given information, ^{each} \$1 of price $\downarrow \Rightarrow x \uparrow$ by 20

$\therefore$ expect p to be a linear function of x

$$p = mx + c$$

given $x = 200 \Rightarrow p = 15$

$$\therefore 15 = 200m + c \quad \text{--- (1)}$$

$$14 = 220m + c \quad \text{--- (2) from the given info *}$$

$$(1) - (2) \quad 1 = -20m$$

$$m = -0.05 \quad \text{--- (3)}$$

insert (3) in (1)

$$15 = 200(-0.05) + c$$

$$c = 25$$

$$\therefore p = -0.05x + 25 \quad \text{--- (4)}$$

$$R = p \cdot x$$

But the question asks to express R in terms of p by saying express the R as a function of p ... in the question

$\therefore$ Need to rearrange (4) to obtain $x = f(p)$

$$\therefore 0.05x = 25 - p$$

$$x = 500 - 20p \quad \text{--- (5)}$$

$$\therefore R = p(500 - 20p) = 500p - 20p^2$$

$$= -20\left(p^2 - \frac{500}{20}p\right) = -20\left(p^2 - 2\left(\frac{25}{2}\right)p + \left(\frac{25}{2}\right)^2\right) + 20\left(\frac{25}{2}\right)^2$$

$$= -20\left(p - 12.5\right)^2 + 3125$$

vertex @ $p = 12.5 \Rightarrow$ sell at \$12.50 to get max ticket revenue