Q. If $Q = \sqrt{2+P}$ is a supply function, find the elasticity of ~~demand~~ supply when $P=2$

Soln:- We know that,

elasticity of supply $(\eta_s) = \frac{P}{Q} \cdot \frac{dQ}{dP}$

- Given $Q = \sqrt{2+P}$

$$\therefore \frac{dQ}{dP} = \frac{d}{dP}(2+P)^{\frac{1}{2}}$$

$$= \frac{1}{2} \cdot (2+P)^{-\frac{1}{2}} \quad \left| \ \frac{1}{2}-1 = -\frac{1}{2} \right.$$

$$= \frac{1}{2 \cdot \sqrt{2+P}}$$

$$\therefore \eta_s = \frac{P}{Q} \cdot \frac{dQ}{dP}$$

$$= \frac{P}{\sqrt{2+P}} \cdot \frac{1}{2 \cdot \sqrt{2+P}}$$

$$= \frac{P}{2 \cdot (2+P)}$$

when $P = 2$, $\eta_s = \frac{2}{2 \cdot (2+2)}$

$$= \frac{1}{4}$$

Q: Show the relation bet^n MC and AC using Product rule.

Soln:- Let average cost (AC) is a function of quantity produced such that

$$AC = C(q)$$

But $TC = AC \times q$

$$= C(q) \times q$$

We know that,

$$MC = \frac{d}{dq}(TC)$$

$$= \frac{d}{dq}\left[C(q) \times q\right]$$ (1st fun^n, 2nd fun^n)

$$= C(q) \cdot \frac{dq}{dq} + q \cdot \frac{d}{dq}\left[C(q)\right]$$

$$= C(q) \cdot 1 + q \cdot C'(q)$$

$$= AC + q \cdot C'(q)$$

$$\Rightarrow MC - AC = q \cdot C'(q) \longrightarrow (1)$$

Eq^n (1) is the relation bet^n MC and AC where $C'(q)$ is the slope of the curve AC.