



Derivatives as a Rate Measurer Ex 13.2 Q13

Here, curve is

$$y = x^2 + 2x$$

$$\text{And } \frac{dy}{dx} = 1 \quad \text{---(i)}$$

$$y = x^2 + 2x$$

$$\Rightarrow \frac{dy}{dx} = 2x \frac{dx}{dx} + 2 \frac{dx}{dx}$$

$$\Rightarrow \frac{dy}{dx} = \frac{dx}{dx} (2x + 2)$$

Using equation (i),

$$2x + 2 = 1$$

$$2x = -1$$

$$x = -\frac{1}{2}$$

$$\text{So, } y = x^2 + 2x$$

$$= \left(-\frac{1}{2}\right)^2 + 2\left(-\frac{1}{2}\right)$$

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

$$y = -\frac{3}{4}$$

So, required points is $\left(-\frac{1}{2}, -\frac{3}{4}\right)$.

Derivatives as a Rate Measurer Ex 13.2 Q14

Here,

$$\frac{dx}{dt} = 4 \text{ units/sec, and } x = 2$$

And, $y = 7x - x^3$

Slope of the curve (S) = $\frac{dy}{dx}$

$$S = 7 - 3x^2$$

$$\begin{aligned}\frac{ds}{dt} &= -6x \frac{dx}{dt} \\ &= -6(2)(4) \\ &= -48 \text{ units/sec}\end{aligned}$$

So, slope is decreasing at the rate of 48 units/sec.

Derivatives as a Rate Measurer Ex 13.2 Q15

Here,

$$\frac{dy}{dt} = 3 \frac{dx}{dt} \quad \text{---(i)}$$

And, $y = x^3$

$$\frac{dy}{dt} = 3x^2 \frac{dx}{dt}$$

$$3 \frac{dx}{dt} = 3x^2 \frac{dx}{dt} \quad \text{[Using equation (i)]}$$

$$3x^2 = 3$$

$$x^2 = 1$$

$$x = \pm 1$$

$$\text{Put } x = 1 \Rightarrow y = (1)^3 = 1$$

$$\text{Put } x = -1 \Rightarrow y = (-1)^3 = -1$$

So, the required points are (1,1) and (-1,-1).

***** END *****