



Tangents and Normals Ex 16.1 Q12

The given equation are

$$y = 2x^2 - x + 1 \quad \text{---(i)}$$

$$y = 3x + 4 \quad \text{---(ii)}$$

Slope to (i) is

$$\frac{dy}{dx} = 4x - 1 \quad \text{---(iii)}$$

Slope to (ii) is

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

According to the question

$$4x - 1 = 3$$

$$\Rightarrow x = 1$$

Thus from (i)

$$y = 2$$

Hence, the point is $(1, 2)$.

Tangents and Normals Ex 16.1 Q13

The given equation of curve is

$$y = 3x^2 + 4 \quad \text{---(i)}$$

$$\text{Slope} = m_1 = \frac{dy}{dx} = 6x \quad \text{---(ii)}$$

Now,

$$\text{The given slope } m_2 = \frac{-1}{6}$$

We have,

tangent to (i) is perpendicular to the tangent whose slope is $\frac{-1}{6}$

$$\therefore m_1 \times m_2 = -1$$

$$\Rightarrow 6x \times \frac{-1}{6} = -1$$

$$\Rightarrow x = 1$$

From (i)

$$y = 7$$

Thus, the required point is $(1, 7)$.

Tangents and Normals Ex 16.1 Q14

The given equation of curve and the line is

$$x^2 + y^2 = 13 \quad \text{---(i)}$$

$$\text{and } 2x + 3y = 7 \quad \text{---(ii)}$$

Slope = m_1 for (i)

$$m_1 = \frac{dy}{dx} = \frac{-x}{y} \quad \text{---(iii)}$$

Slope = m_2 for (ii)

$$m_2 = \frac{dy}{dx} = \frac{-2}{3} \quad \text{---(iv)}$$

According to the question

$$m_1 = m_2$$

$$\Rightarrow \frac{-x}{y} = \frac{-2}{3}$$

$$\Rightarrow x = \frac{2}{3}y$$

From (i)

$$\frac{4}{9}y^2 + y^2 = 13$$

$$\Rightarrow \frac{13y^2}{9} = 13$$

$$\Rightarrow y = \pm 3$$

$$\therefore x = \pm 2$$

Thus, the points are $(2, 3)$ and $(-2, -3)$.

Tangents and Normals Ex 16.1 Q15

The given equation of the curve is

$$2a^2y = x^3 - 3ax^2 \quad \text{---(i)}$$

Differentiating with respect to x , we get

$$2a^2 \frac{dy}{dx} = 3x^2 - 6ax$$

$$\therefore \text{Slope } m_1 = \frac{dy}{dx} = \frac{1}{2a^2} [3x^2 - 6ax] \quad \text{---(ii)}$$

Also,

$$\begin{aligned} \text{Slope } m_2 &= \frac{dy}{dx} = \tan \theta \\ &= \tan 0^\circ = 0 \end{aligned}$$

[\because Slope is parallel to x -axis]

$$\therefore m_1 = m_2$$

$$\Rightarrow \frac{1}{2a^2} [3x^2 - 6ax] = 0$$

$$\Rightarrow 3x[x - 2a] = 0$$

$$\Rightarrow x = 0 \text{ or } 2a$$

\therefore From (i)

$$y = 0 \text{ or } -2a$$

Thus, the required points are $(0, 0)$ or $(2a, -2a)$.

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