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Tangents and Normals Ex 16.1 Q1(i)

We know that the slope of the tangent to the curve $y = f(x)$ is

$$\frac{dy}{dx} = f'(x) \qquad \text{---(A)}$$

And the slope of the normal is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} \qquad \text{---(B)}$$

Now,

$$y = \sqrt{x^3}$$

$$\therefore \quad \frac{dy}{dx} = \frac{3x^2}{2\sqrt{x^3}}$$

$\therefore$ Slope of tangent at $x = 4$ is

$$\left(\frac{dy}{dx}\right)_{x=4} = \frac{3.16}{2\sqrt{64}} = \frac{48}{16} = 3$$

Slope of normal at $x = 4$ is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} = \frac{-1}{3}$$

Tangents and Normals Ex 16.1 Q1(ii)

We know that the slope of the tangent to the curve $y = f(x)$ is

$$\frac{dy}{dx} = f'(x) \qquad \text{---(A)}$$

And the slope of the normal is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} \qquad \text{---(B)}$$

$$y = \sqrt{x}$$

$$\therefore \quad \frac{dy}{dx} = \frac{1}{2\sqrt{x}}$$

$\therefore$ Slope oftangent at $x = 9$.

$$\therefore \quad \left(\frac{dy}{dx}\right)_{x=9} = \frac{1}{2\sqrt{9}} = \frac{1}{6}$$

Also, the slope of normal is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} = -6$$

Tangents and Normals Ex 16.1 Q1(iii)

We know that the slope of the tangent to the curve $y = f(x)$ is

$$\frac{dy}{dx} = f'(x) \qquad \text{---(A)}$$

And the slope of the normal is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} \qquad \text{---(B)}$$

$y = x^3 - x$

$\therefore \quad \frac{dy}{dx} = 3x^2 - 1$

$\therefore$ Slope of tangent at $x = 2$ is

$$\left(\frac{dy}{dx}\right)_{x=2} = 3.2^2 - 1 = 11$$

Slope of normal is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} = \frac{-1}{11}$$

Tangents and Normals Ex 16.1 Q1(iv)

We know that the slope of the tangent to the curve $y = f(x)$ is

$$\frac{dy}{dx} = f'(x) \qquad \text{---(A)}$$

And the slope of the normal is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} \qquad \text{---(B)}$$

$y = 2x^2 + 3\sin x$

$\therefore \quad \frac{dy}{dx} = 4x + 3\cos x$

So, slope of tangent of $x = 0$ is

$$\left(\frac{dy}{dx}\right)_{x=0} = 4.0 + 3\cos 0° = 3$$

And slope of normanl is

$$\frac{-1}{\frac{dy}{dx}} = \frac{-1}{f'(x)} = \frac{-1}{3}$$

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