

Tangents and Normals Ex 16.1 Q1(i)

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

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

And the slope of the normal is

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

Now,

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

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

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

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

And the slope of the normal is

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

$$y = \sqrt{x}$$

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

Slope oftangent at x = 9.

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

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

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

And the slope of the normal is

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

$$y = x^3 - x$$

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

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

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

And the slope of the normal is

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

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

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

So, slope of tangent of x = 0 is

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

And slope of normanl is

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