19/MHS01/397

4 $y = 1 + x - x^2$ at the point $(-2, -5)$ (x_1, y_1)

Solution

$y = 1 + x - x^2$

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

$\frac{dy}{dx}|_{x=-2} = 1 - 2(-2)$

$m = 5$

For tangent, $y - y_1 = m(x - x_1)$

$y + 5 = 5(x + 2)$

$y + 5 = 5x + 10$

$y - 5x + 5 - 10 = 0$

$y - 5x - 5 = 0$

∴ The Equation of tangent is,

$y - 5x - 5 = 0$

For normal, $y - y_1 = \frac{-1}{m}(x - x_1)$

$y + 5 = \frac{-1}{5}(x + 2)$

$5y + 5 = -x - 2$

$5y + x + 5 + 2 = 0$

$5y + x + 7 = 0$.

∴ The equation of the normal, is $5y + x + 7 = 0$.

5 $y = 1/x$ at the point $(3, 1/3)$

Solution

$y = 1/x = x^{-1}$

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

$\frac{dy}{dx}|_{x=3} = -\frac{1}{3^2} = \frac{-1}{9}$

$m = \frac{-1}{9}$

For tangent, $y - 1/3 = \frac{-1}{9}(x - 3)$

$9y - 3 = -x + 3$

$9y - 3 + x - 3 = 0$

$9y + x - 6 = 0$

∴ The equation of the tangent is;

$9y + x - 6 = 0$

For normal, $y - y_1 = \frac{-1}{m}(x - x_1)$

$y - \frac{1}{3} = \frac{-1}{\frac{-1}{9}}(x - 3)$

$y - \frac{1}{3} = 9(x - 3)$

$y - \frac{1}{3} = 9x - 27$

$y - 9x - \frac{1}{3} + 27 = 0$

$3y - 27x - 1 + 81 = 0$

$3y - 27x + 80 = 0$

∴ The equation of the normal is $3y - 27x + 80 = 0$.