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

Solution

$x = -2, \ y = -5$

$y = 1 + x - x^2$

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

$m = 1 - 2(-2) = 1 + 4 = 5$,,

for equation of the tangent

$y - y_1 = m(x - x_1)$

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

$y + 5 = 5x + 10$

$y - 5x - 5 = 0$,, (equation of the tangent)

for equation of the normal

$y - y_1 = -\frac{1}{m_1}(x - x_1)$

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

$5y + 25 = -x - 2$

$5y + x + 27 = 0$,, (equation of the normal)

5) $y = \frac{1}{x}$ at the point $(3, \frac{1}{3})$

Solution

$x = 3, \ y = \frac{1}{3}$

$y = \frac{1}{x}$

$y = x^{-1}$

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

$m = -(3)^{-2} = \frac{-1}{3^2} = -\frac{1}{9}$,,

for equation of the tangent

$y - y_1 = m(x - x_1)$

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

$9y - 3 = -1(x - 3)$

$9y - 3 = -x + 3$

$9y + x - 6 = 0$,, (equation of the tangent)

for equation of the normal

$y - y_1 = \frac{1}{m_1}(x - x_1)$

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

multiply through by 3

$3y - 1 = 27(x - 3)$

$3y - 1 = 27x - 81$

$3y - 27x + 80 = 0$,, (equation of the normal)

(2) $y = 3x^2 - 2x$ at point $(2, 8)$

solution

$x = 2, \quad y = 8$

$y = 3x^2 - 2x$

$\frac{dy}{dx} = 6x - 2$

$m = 6(2) - 2$

$= 12 - 2 = 10$ //

for equation of the tangent

$y - y_1 = m(x - x_1)$

$y - 8 = 10(x - 2)$

$y - 8 = 10x - 20$

$y - 10x + 12 = 0$ // (equation of the tangent)

for equation of the normal

$y - y_1 = -\frac{1}{m_1}(x - x_1)$

$y - 8 = -\frac{1}{10}(x - 2)$

$10y - 80 = -x + 2$

$10y + x - 82 = 0$ (equation of the normal)

(3) $y = \frac{x^3}{2}$ at the point $(-1, -\frac{1}{2})$

SOLUTION

$x = -1, \quad y = -\frac{1}{2}$

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

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

$m = \frac{3(-1)^2}{2} = \frac{3}{2}$ //

for equation of the tangent

$y - y_1 = m(x - x_1)$

$\left(y + \frac{1}{2}\right) = \frac{3}{2}(x + 1)$

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$ // (equation of the tangent)

for equation of the normal

$y - y_1 = -\frac{1}{m_1}(x - x_1)$

$\left(y + \frac{1}{2}\right) = -\frac{2}{3}(x + 1)$

$\left(y + \frac{1}{2}\right) = -\frac{2}{3}(x + 1)$

multiply through by 6

$6y + 3 = -4x - 4$

$6y + 4x + 7 = 0$ // (equation of the normal)

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MATHS Assignment Answer-

(1) $y = 2x^2$ at the point (1, 2)

Solution

~~For equation of the tangent~~ $x = 1, y = 2$

$y = 2x^2$

$\frac{dy}{dx} = 4x$

$m = 4(1)$

$m = 4$

For equation of the tangent

$y - y_1 = m(x - x_1)$

$y - 2 = 4(x - 1)$

$y - 2 = 4x - 4$

$y - 2 - 4x + 4 = 0$

$y - 4x + 2 = 0$ (equation of the tangent)

For equation of the normal

$y - y_1 = \frac{-1}{m_1}(x - x_1)$

$(y - 2) = \frac{-1}{4}(x - 1)$

$4y - 8 = -1(x - 1)$

$4y - 8 = -x + 1$

$4y + x - 9 = 0$ (equation of the normal)