Assignment Answer

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

Solution

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

$\frac{dy}{dx}/x \to 1 = 4$, $m = \frac{dy}{dx}/x \to 1$

$\therefore m = 4$

$y - y_1 = m(x - x_1)$ (Equation of tangent)

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

$y - 2 = 4x - 4$

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

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

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

$4y - 8 = -x + 1$

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

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

Solution

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

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

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

Solution

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

$\frac{dy}{dx}_{x=2} = 12 - 2 = 10$, $m = \frac{dy}{dx}/_{x=2}$

$\therefore m = 10$

$y - y_1 = m(x - x_1)$ (Equation of tangent)

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0$ (Equation of tangent)

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

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

$10y - 80 = -x + 2$

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

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

Solution

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

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

$\frac{dy}{dx}|_{x=-1} = \frac{3}{2}$ $\quad m = \frac{dy}{dx}|_{x=-1}$

$\therefore m = \frac{3}{2}$

$y - y_1 = m(x - x_1)$ (Equation of tangent

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

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

Multiply through by 2

$2y + 1 = 3(x+1)$

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$ (Equation of tangent)

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

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

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

Multiply through by 6

$6y + 3 = -4(x+1)$

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

$6y + 4x + 7 = 0$ (Equation of normal)

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

Solution

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

$\frac{dy}{dx}/x \to -2 = -2(-2) + 1$, $m = \frac{dy}{dx}/x \to -2$

$\therefore m = 5$

$y - y_1 = m(x - x_1)$ (Equation of tangent)

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

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

$y+5=5x+10$

$y-5x-5=0$ (Equation of tangent)

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

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

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

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

$5y+25=-x-2$

$5y+x+27=0$ (Equation of normal)

$\frac{1}{x}$ at $(3, \frac{1}{3})$

Solution

$y=x^{-1}$

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

$\frac{dy}{dx}/x\to 3=-3^{-2}=\frac{1}{(-3)^2}=\frac{1}{9}$

$m=\frac{dy}{dx}/x\to 3$

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

$y-y_1=m(x-x_1)$ (Equation of tangent)

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

Multiply through by 9

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

$5y+25 = -x-2$

$5y+x+27 = 0$ (Equation of normal)

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

Solution

$y = x^{-1}$

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

$\frac{dy}{dx}/x \to 3 = -3^{-2} = \frac{1}{(-3)^2} = \frac{1}{9}$

$m = \frac{dy}{dx}/x \to 3$

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

$y - y_1 = m(x - x_1)$ (Equation of tangent)

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

Multiply through by 9

$9y - 3 = x - 3$

$9y - x = 0$ (Equation of tangent)

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

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

Multiply through by 3

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

$3y - 1 = 27x - 81$

$3y - 27x + 80 = 0$ (Equation of normal)