Iboxu Chibuzor Grace
Medicine & Surgery
19/mhs01186
MAT 104

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Assignment

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

$dy/dx = 4x$

$\frac{dy}{dx}\Big|_{x=1}$ $\quad 4(1) = 4$

$m = 4$

Equation of 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 normal

$y - y_1 = -1/m(x - x_1)$

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

$y - 2 = -1/4x + 1/4$

$y - 2 + 1/4x - 1/4 = 0$

$y + 1/4x - 9/4 = 0$

OR

$4y + x - 9 = 0$

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

$dy/dx = 6x - 2$

$\frac{dy}{dx}\Big|_{x=2}$ $\quad f(2) 6(2) - 2 = 10$

$m = 10$

Equation of the tangent

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

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

$y - 8 = 10x - 20$

$y - 8 + 10x + 20 = 0$

$y - 10x + 12 = 0$

Equation of the normal

$y - y_1 = -1/m(x - x_1)$

$y - 8 = -1/10(x - 2)$

$y - 8 = -1/10x + 1/5$

$y - 8 + 1/10x - 1/5 = 0$

$y + 1/10x - 41/5 = 0$

$5y + 1/2x - 41 = 0$

$10y + x - 82 = 0$

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

$dy/dx = 6x^2/4$

$\frac{dy}{dx}\Big|_{x=-1}$ $\frac{6(-1)^2}{4} = \frac{6}{4} = 3/2$

$m = 3/2$

Equation of tangent

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

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

$y + 1/2 = 3/2x + 3/2$

$y + 1/2 - 3/2x - 3/2 = 0$

$y - 3/2x - 1 = 0$

$2y - 3x - 2 = 0$

Equation of the normal

$y - y_1 = -1/m(x - x_1)$

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

$y + 1/2 = -2/3x - 2/3$

$y + 1/2 + 2/3x + 2/3 = 0$

$y + 2/3x + 7/6 = 0$

$3y + 2x + 7/2 = 0$

$6y + 4x + 7 = 0$

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

$y = -x^2 + x + 1$

$dy/dx = -2x + 1$

$\frac{dy}{dx}\Big|_{x=-2}$ $-2(-2) + 1 = 4 + 1 = 5$

$m = 5$

Equation of tangent

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

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

$y + 5 = 5x + 10$

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

$y - 5x - 5 = 0$

Equation of the normal

$y - y_1 = -1/m(x - x_1)$

$y + 5 = -1/5(x+2)$

$y + 5 = -1/5x - 2/5$

$y + 5 + 1/5x + 2/5 = 0$

$y + 1/5x + 27/5 = 0$

$5y + x + 27 = 0$

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

$dy/dx = -1/x^2$

$\left.\frac{dy}{dx}\right|_{x=3}$ $\quad \frac{-1}{x^2} = \frac{-1}{(3)^2} = \frac{-1}{9}$

$m = -1/9$

Equation of tangent

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

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

$y - 1/3 = -1/9x + 1/3$

$y - 1/3 + 1/9x - 1/3 = 0$

$y + 1/9x - 2/3 = 0$

$3y + 1/3x - 2 = 0$

$9y + x - 6 = 0$

Equation of the normal

$y - y_1 = -1/m(x - x_1)$

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

$y - 1/3 = 9x - 27$

$y - 1/3 + -9x + 27 = 0$

$y - 9x + 80/3 = 0$

$3y - 27x + 80 = 0$