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

Solution

$y = 2x^2$; $dy/dx = 4x$

$dy/dx|_{x=1} = 4(1) = 4$

$m = 4$

a) Equation for tangent

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

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

$y - 2 = 4x - 4$

$y - 4x + 2 = 0$

b) Equation of the normal

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

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

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

$4y - 8 = -x + 1$

$4y + x - 9 = 0$

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

Solution

$y = 3x^2 - 2x$

$dy/dx = 6x - 2$

$dy/dx|_{x=2} = 6(2) - 2 = 12 - 2 = 10$

a) 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

$y - 10x + 12 = 0$

b) Equation of the normal

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

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

$(y - 8) \times 10 = -x + 2$

$10y - 80 = -x + 2$

$\therefore 10y + x - 82 = 0$

3) $y = x^{3/2} + 7x$ Pnt $(-1, -1/2)$

Solution

$y = x^{3/2}$

$dy/dx = 3/2 x^2$

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

$m = 3/2$

a) Equation of the tangent

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

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$

b) for normal

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

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

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

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

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

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

Solution

$y = 1 + x - x^2$

$dy/dx = 1 - 2x$

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

$1 - \quad 1 + 4 = 5$

$m = 5$

a) Equation of the tangent

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

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

$y + 5 = 5x + 10$

$y - 5x - 5 = 0$

b) Equation of the normal

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

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

$5y + 20 = -x - 2$

$5y + x + 22 = 0$

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

Solution

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

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

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

$m = -1/9$

a) Equation of the tangent

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

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

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

$9y - 3 = -x + 3$

$9y + x - 6 = 0$

b) Equation of the normal

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

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

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

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

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