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MHS MBBS
Maths 104

Assignment

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

$y = 2x^2$

$m = dy/dx = 4x$

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

$m = 4 \quad x_1 = 1, y_1 = 2$

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

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

$y - 2 = 4x - 4$

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

$4 - 4x + 2 = 0$ Equation of tangent

For the equation of the normal

$m_1 m_2 = -1$

$m_2 = \frac{-1}{m_1} = \frac{-1}{4}$ (-0.25)

$y - y_1 = m_2(x - x_1)$

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

$4y - 8 = -x + 1$

$4y - 8 + x - 1 = 0$

$4y + x - 9 = 0$

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

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

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

$m_1 = 10, \quad x_1 = 2, \quad y_1 = 8$

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Express yourself

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Express yourself

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

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

$y - 8 = 10x - 20$

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

$y - 10x + 12 = 0$

b) Equation of the normal

$m_1 m_2 = -1$

$m_2 = \frac{-1}{m_1} = \frac{-1}{10}$

$y - y_1 = m_2(x - x_1)$

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

$10y - 80 = -x + 2$

$10y - 80 + x - 2 = 0$

$10y + x - 82 = 0$

③ $y = x^{3/2}$ at point $(-2, 5)$

$m = \frac{dy}{dx} = \frac{3 \cdot 1}{2}(x) = \frac{3}{2}x^2$

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

$m = 3/2, \; x_1 = -1, \; y_1 = -1/2$

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

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

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

$2y + 1 = 3x + 3$

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

$2y - 3x - 2 = 0$

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Express yourself

b) Equation of the normal
$m_1 m_2 = -1$
$m_2 = \frac{-1}{3/2} = \frac{-2}{3}$
$y - y_1 = m_2(x - x_1)$
$y - (-1/2) = \frac{-2}{3}(x - -1)$
$y + 1/2 = -2/3 (x+1)$
$3y + \frac{3}{2} = -2x - 2$
$3y + \frac{3}{2} + 2x + 2 = 0$

(4) $y = 1 + x - x^2$ at point $(-2, 5)$
$m = \frac{dy}{dx} = 1 - 2x$
$\left.\frac{dy}{dx}\right|_{x=-2} = 1 - 2(-2) = 1 + 4 = 5$
$m = 5, \; y_1 = -5, \; x_1 = -2$
a) $y - y_1 = m(x - x_1)$
$y - (-5) = 5(x - -2)$
$y + 5 = 5(x+2)$
$y + 5 = 5x + 10$
$y + 5 - 5x - 10 = 0$
$y - 5x - 5 = 0$
b) For equation of the normal
$m_1 m_2 = -1$
$m_2 = -1/m_1 = -1/5$
$y - y_1 = m(x - x_1)$
$y + 5 = -1/5 (x+2)$
$5y + 25 = -x - 2$
$5y + 25 + x + 2 = 0$
$5y + x + 27 = 0$

Shot on HOT S3
Express yourself

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

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

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

$m = \frac{1}{9}, x = 3, y = \frac{1}{3}$

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

$9y - 3 = x - 3$

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

$9y - x = 0$ [equation of the tangent]

b) ~~Normal~~ for equation of the normal

$m_1 \cdot m_2 = -1$

$m_2 = -\frac{1}{9} = -9$

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

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

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

$y + 9x - \frac{82}{3} = 0$

$3y + 27x - 82 = 0$