AGAN SHALOM ULAULIN
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MAT 104 Assignment

For the curves in Problem 1-5, at the points given find the equation of the tangents and equation of the normal

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

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

3) $y = \frac{4}{8}x^3/3$ at $(-1, -1)$

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

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

Solution

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

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

$m = 2$

$x_1 = 1, y = 2$

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

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

$y - x - 1 = 0$ (equation of tangent)

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

$\frac{dy}{dx} = 3x^2 - 2x = 3(2)^2 - 2(2) = 8$

$m = 8$

$x_1 = 2, y = 8$

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

$y - x - 14 = 0$ (equation of tangent)

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

$\frac{dy}{dx} = \frac{-1^3}{2} = \frac{-1}{2}$

$m = \frac{-1}{2}$

$y_1 = -1, x_1 = -1$

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

$y+1+\frac{1}{2}-x-1 = 0$

$y-x-1 = 0$ (equation of tangent & normal

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

$\frac{dy}{dx} = 1+(-2)-(-2)^2$

$\frac{dy}{dx} = 1-2-4 = -5$

$m = -5$

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

$y+5+5-x-2 = 0$

$y-x+8 = 0$ (equation of tangent & normal)

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

$\frac{dy}{dx} = \frac{1}{x} = \frac{1}{3}$, $m = \frac{1}{3}$

$y-3 = \frac{1}{3}(x-3) \Rightarrow y-x-\frac{1}{3}+3 = 0$

$y-x-\frac{1}{3} = 0$ (equation of tangent & normal