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19/mhs01/113
Medicine & surgery

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

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

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

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

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

$y - 2 = 4x - 4$

$y - 4x + 2 = 0$ (which gives eqn of tangent)

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

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

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

$4y + x - 9 = 0$ (which gives eqn the)

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

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

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0$ (which gives eqn of tangent)

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

$10y - 80 = -x + 2$

$10y + x - 82 = 0$ (which gives eqn of the normal)

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

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

$y = y_1 = m(x - x_2)$

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$ (which gives eqn of tangent)

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

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

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

$6y + 4x + 7 = 0$ (which gives eqn of tang)

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

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

$4 + 4r = m(x - x_4)$

$4 + 5 = 5(x+2)$

$y - 5x - 5 = 0$ (which eqn of tangent)

$y + y_1 = \frac{1}{m}(x - x_1)$

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

$5y + 25 = x - 2$

$5y + x + 27 = 0$ (which gives eqn of normal)

5.) $y = 1/x = x^{-1}$ at $(3, 1/3)$

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

$\therefore \frac{dy}{dx}\Big|_{x=3} \frac{-1}{(3)^2} = -1/9$

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

$9y - 3 = -x + 3$

$9y + x - 6 = 0$ (which gives eqn of the tangent)

$y - y_1 = -1/m\,[-x - x_1]$

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

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

$3y - 1 = +27x - 80$

$3y - 37x + 80 = 0$ (which gives eqn of a normial)