PAL pensions

MATHS ASSIGNMENT (MAT 104)

NAME: Daniel Damilola Favour

Mat NO: 19/MHS01/133

Department: Medicine and surgery.

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

$\frac{dy}{dx} = 4x$

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

$M = 4$

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

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

$y - 2 = 4x - 4$

$y - 4x + 2 = 0$ which gives the equation of tangent

For equation of normal

$M_1 M_2 = -1$

$y_2 - y_1 = M_2(x - x_1)$

$y - 2 = \frac{-1}{4}[x - 1]$

$4y - 8 = -1(x - 1)$

$4y - 8 = -x + 1$

$4y + x - 9 = 0$ which gives the equation of normal

Head Office: 289, Ajose Adeogun, Victoria Island, Lagos
Pension Service Centre: 205B Ikorodu road, Obanikoro, Lagos.
+234(1)2776900, 0800PALPENSIONS (08007257367467)
info@palpensions.com

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

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

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

$\therefore M = 10$

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

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

$y - 8 = 10x - 20$

$y - 10x + 12 = 0$ which gives the equation of tangent.

For equation of Normal

$M_1 M_2 = -1$

$10 \cdot M_2 = -1$

$M_2 = -1/10$

$y - y_1 = M_2(x - x_1)$

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

$10y - 80 = -x + 2$

$10y + x - 82 = 0$ which gives the equation of the normal.

3. $y = \frac{x^3}{2}$ at point $[-1, -1/2]$

$\frac{dy}{dx} = \frac{3x^2}{2}$

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

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$M = \frac{3}{2}$

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

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

$2y + 1 = 3x + 3$

$2y - 3x - 2 = 0$ which gives the equation of tangent

For equation of the Normal

$M_1 M_2 = -1$

$\frac{3}{2} \cdot M_2 = -1$

$M_2 = -1/3/2$

$M_2 = -2/3$

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

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

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

$3y + 2x + \frac{7}{2} = 0$ ~~which gives~~

$6y + 4x + 7 = 0$ which gives the equation of the normal.

4. $y = 1 + x - x^2$ at point $[-2, -5]$

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

$\frac{dy}{dx} \Big| x = -2 \quad 1 - 2 \cdot -2 = 5$

$M = 5$

$y - y_1 = M[x - x_1]$

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$y-(-5)=5[x-(-2)]$

$y+5=5x+10$

$y-5x-5=0$ which gives the equation of the tangent

For equation of the normal

$M_1M_2=-1$

$5 \cdot M_2=-1$

$M_2=-1/5$

$y-(-5)=-1/5[x-(-2)]$

$5y+25=-x-2$

$5y+x+27=0$ which gives the equation of the normal.

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

$y=x^{-1}$

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

$\frac{dy}{dx}|x=3=-3^{-2}=\frac{-1}{3^2}=\frac{-1}{9}$

$M=-1/9$

$y-y_1=M_2(x-x_1)$

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

$9y-3=-x+3$

$9y+x-6=0$ which gives the equation of the tangent

For the equation of Normal

$M.M_2=-1$

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$-1/9 \cdot M_2 = -1$

$M_2 = -1/-1/9 = 9$

$\therefore y - y_1 = M_2(x - x_1)$

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

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

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

$y - 9x + \frac{80}{3} = 0$

$3y - 27x + 80 = 0$ which gives the equation of normal.