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NAME: ADELEKE BLESSING OLUWATOKEMI
DEPARTMENT: MEDICINE AND SURGERY
COLLEGE: MEDICINE AND HEALTH SCIENCES
MATRIC NO: 19/MHS01/030
COURSE CODE: MAT 104
Assignment solution.

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

(a) The equation of the tangent

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

$y = 2x^2$

$m = \frac{dy}{dx} = 4x$ at $x = 1$

$m = 4(1)$

$m = 4$

$4 \times \frac{y - 2}{x - 1}$

$4[x - 1] = y - 2$

$4x - 4 = y - 2$

$4x - y = -2 + 4$

$4x - y = 2$

$4x - y - 2 = 0$

Q2

[b] The equation of the normal

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

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

$$-1[x-1] = 4[y-2]$$

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

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

$$-x - 4y = -10$$

$$x + 4y - 10 = 0$$

[2] $y = 3x^2 - 2x$ at point [2, 8]

[2] The equation of the tangent

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

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

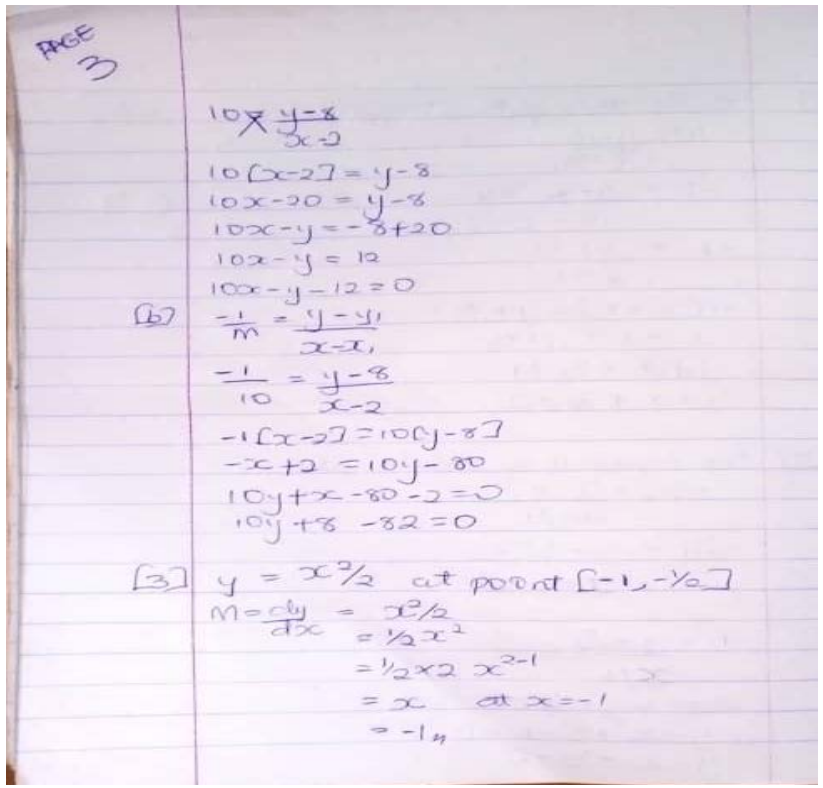
$$= 6x - 2$$

at $x = 2$

$$= 6(2) - 2$$

$$= 12 - 2$$

$$m = 10$$



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$10 \times \frac{y-8}{x-2}$

$10[x-2] = y-8$

$10x-20 = y-8$

$10x-y = -8+20$

$10x-y = 12$

$10x-y-12 = 0$

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

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

$-1[x-2] = 10[y-8]$

$-x+2 = 10y-80$

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

$10y+x-82 = 0$

(3) $y = x^2/2$ at point $[-1, -1/2]$

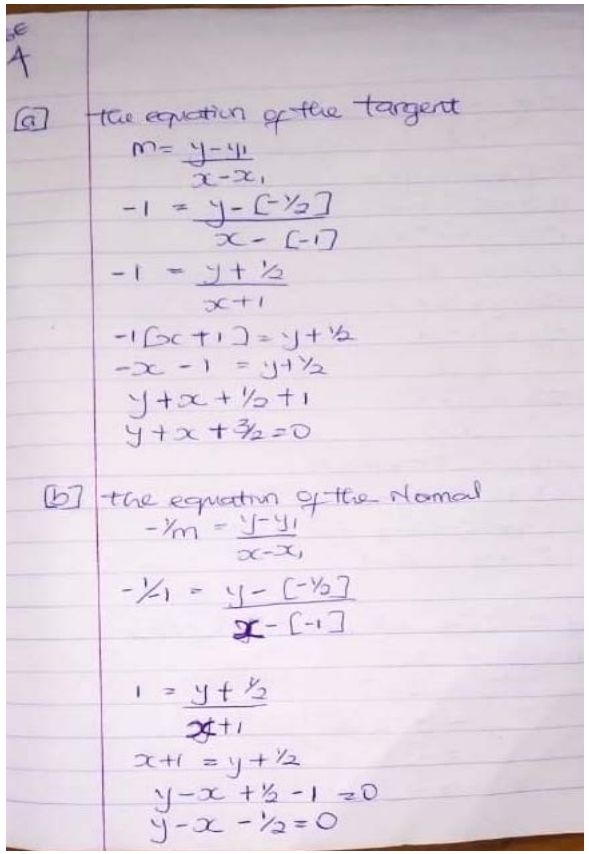
$M = \frac{dy}{dx} = x^2/2$

$= 1/2\, x^2$

$= 1/2 \times 2\, x^{2-1}$

$= x$ at $x = -1$

$= -1_M$



(a) the equation of the tangent

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

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

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

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

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

$$y + x + \frac{1}{2} + 1$$

$$y + x + \frac{3}{2} = 0$$

(b) the equation of the Normal

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

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

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

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

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

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

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

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

$= 1 - 2x$

at $x = -2$

$= 1 - 2[-2]$

$= 1 + 4$

$= 5$

[a] the equation of the tangent

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

$5 = \frac{y - [-5]}{x - [-2]}$

$5 = \frac{y + 5}{x + 2}$

$5[x + 2] = y + 5$

$5x + 10 = y + 5$

$y - 5x + 5 - 10 = 0$

$y - 5x - 5 = 0$

[b] the equation of the Normal

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

$$-\frac{1}{5} = \frac{y-[-5]}{x-[-2]}$$

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

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

$$-x-2 = 5y+25$$

$$5y+x+25+2=0$$

$$5y+x+27=0$$

[5] $y = 1/x$ at the point $[3, 1/3]$

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

$$= x^{-1}$$

$$= -1 \cdot x^{-1-1}$$

$$= -1 \cdot x^{-2}$$

$$= -x^{-2}$$

at $x = 3$

$$= -3^{-2}$$

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

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

[a] the equation of the tangent

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

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

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

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

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

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

$$y + x/9 - 2/3 = 0$$

[b] the equation of the normal

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

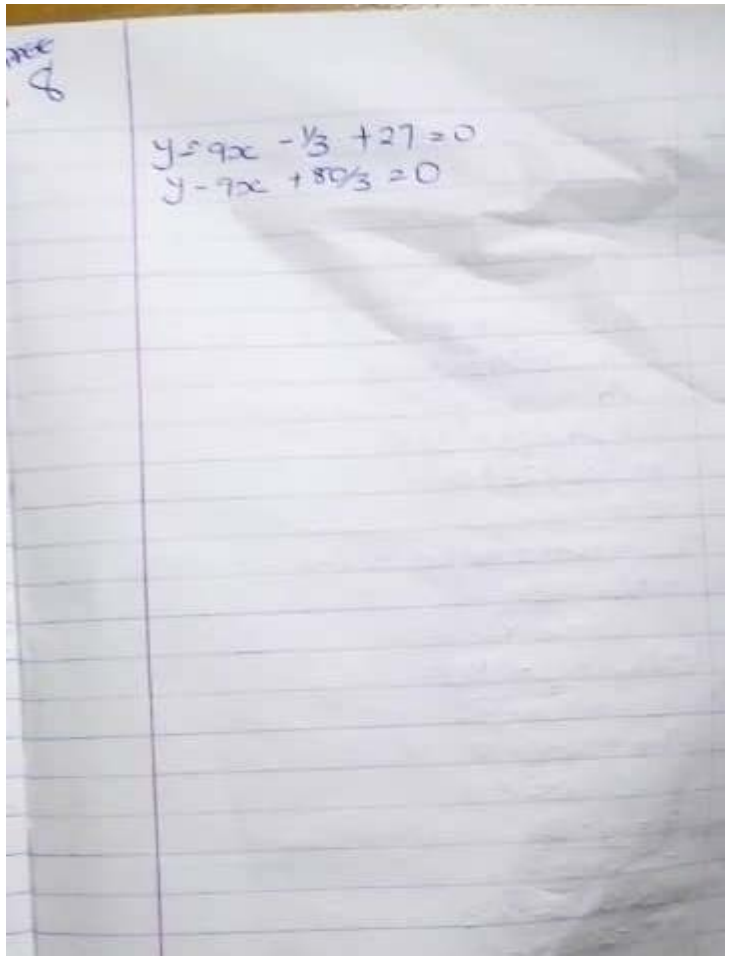
$$-1/(1/9) = \frac{y - [1/3]}{x - 3}$$

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

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

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

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


y=9x -1/3 +27=0
y-9x +80/3 =0