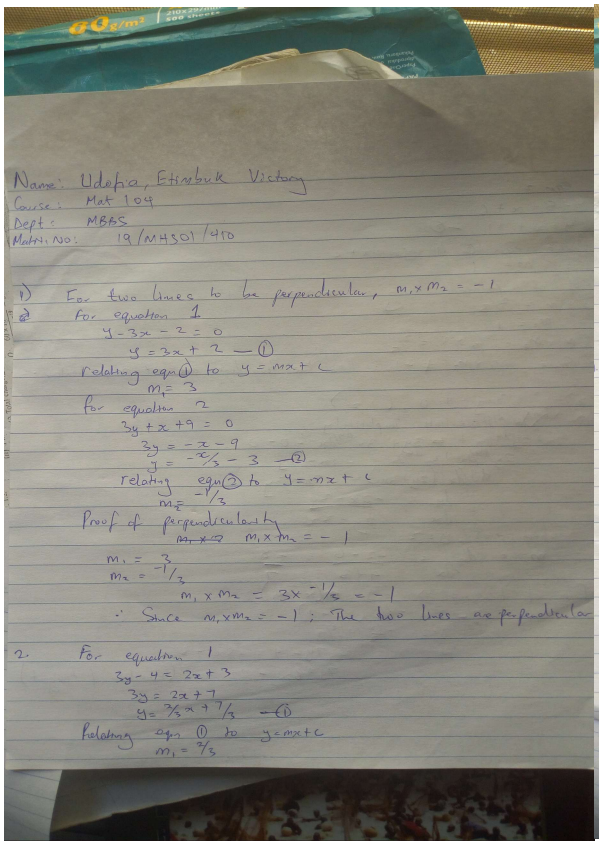
UDOFIA, ETIMBUK VICTORY……19/MHS01/410……MBBS……MAT 104 ASSIGNMENT



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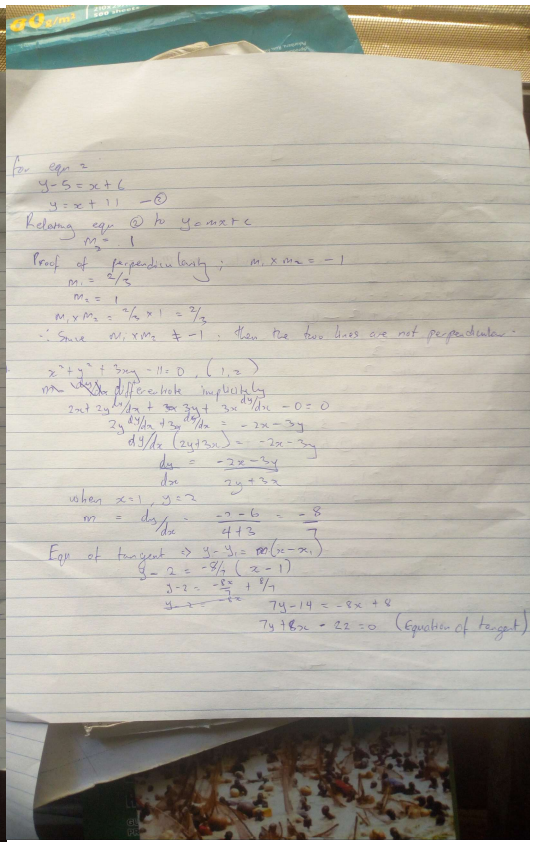
Course: Mat 104
Dept: MBBS
Matric No: 19/MHS01/410

1) For two lines to be perpendicular, $m_1 \times m_2 = -1$

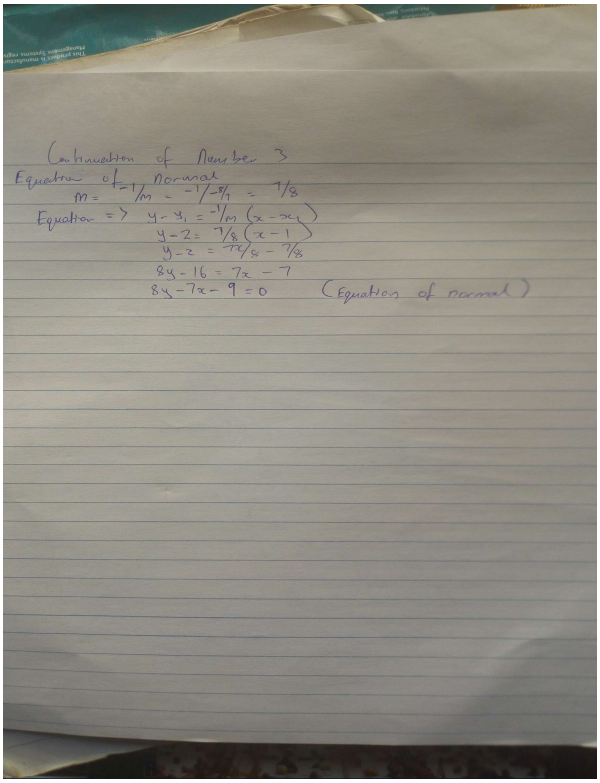
2) For equation 1
$y - 3x - 2 = 0$
$y = 3x + 2$ — ①
relating eqn ① to $y = mx + c$
$m_1 = 3$
For equation 2
$3y + x + 9 = 0$
$3y = -x - 9$
$y = \frac{-x}{3} - 3$ — ②
relating eqn ② to $y = mx + c$
$m_2 = -\frac{1}{3}$
Proof of perpendicularity
$m_1 \times m_2$
$m_1 = 3$
$m_2 = -\frac{1}{3}$
$m_1 \times m_2 = 3 \times -\frac{1}{3} = -1$
∴ Since $m_1 \times m_2 = -1$; The two lines are perpendicular

2. For equation 1
$3y - 4 = 2x + 3$
$3y = 2x + 7$
$y = \frac{2}{3}x + \frac{7}{3}$ — ①
Relating eqn ① to $y = mx + c$
$m_1 = \frac{2}{3}$



For eqn 2
$y - 5 = x + 6$
$y = x + 11$ — ②
Relating eqn ② to $y = mx + c$
$m_2 = 1$
Proof of perpendicularity; $m_1 \times m_2 = -1$
$m_1 = \frac{2}{3}$
$m_2 = 1$
$m_1 \times m_2 = \frac{2}{3} \times 1 = \frac{2}{3}$
∴ Since $m_1 \times m_2 \neq -1$; then the two lines are not perpendicular.

$x^2 + y^2 + 3xy - 11 = 0$, $(1, 2)$
Differentiate implicitly
$2x + 2y\frac{dy}{dx} + 3x\frac{dy}{dx} + 3y - 0 = 0$
$2y\frac{dy}{dx} + 3x\frac{dy}{dx} = -2x - 3y$
$\frac{dy}{dx}(2y + 3x) = -2x - 3y$
$\frac{dy}{dx} = \frac{-2x - 3y}{2y + 3x}$
when $x = 1$, $y = 2$
$m = \frac{dy}{dx} = \frac{-2 - 6}{4 + 3} = -\frac{8}{7}$
Eqn of tangent $\Rightarrow y - y_1 = m(x - x_1)$
$y - 2 = -\frac{8}{7}(x - 1)$
$y - 2 = -\frac{8x}{7} + \frac{8}{7}$
$7y - 14 = -8x + 8$
$7y + 8x - 22 = 0$ (Equation of tangent)



Continuation of Number 3
Equation of Normal
$m = -\frac{1}{m} = -\frac{1}{-8/7} = \frac{7}{8}$
Equation $\Rightarrow$ $y - y_1 = -\frac{1}{m}(x - x_1)$
$y - 2 = \frac{7}{8}(x - 1)$
$y - 2 = \frac{7x}{8} - \frac{7}{8}$
$8y - 16 = 7x - 7$
$8y - 7x - 9 = 0$ (Equation of normal)