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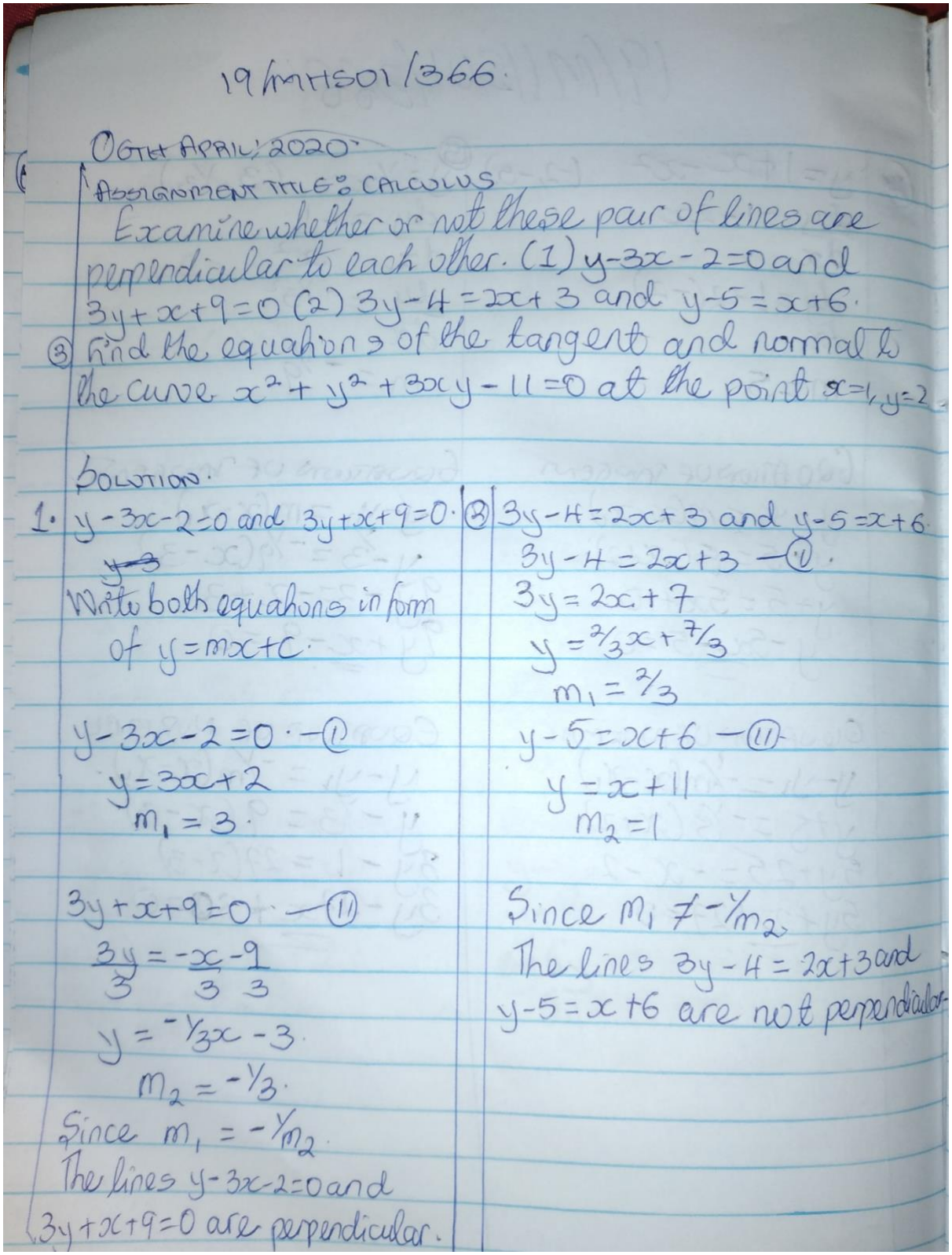
MATRIC NO : 19/MHS01/366

COURSE CODE: MAT 104



19/MHS01/366.

6TH APRIL, 2020.

ASSIGNMENT TITLE: CALCULUS

Examine whether or not these pair of lines are perpendicular to each other. (1) $y-3x-2=0$ and $3y+x+9=0$ (2) $3y-4=2x+3$ and $y-5=x+6$.

(3) Find the equations of the tangent and normal to the curve $x^2+y^2+3xy-11=0$ at the point $x=1, y=2$.

SOLUTION.

1. $y-3x-2=0$ and $3y+x+9=0$.

Write both equations in form of $y=mx+c$.

$y-3x-2=0$ — (i)

$y=3x+2$

$m_1=3$.

$3y+x+9=0$ — (ii)

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

$y=-\frac{1}{3}x-3$.

$m_2=-\frac{1}{3}$.

Since $m_1=-\frac{1}{m_2}$.

The lines $y-3x-2=0$ and $3y+x+9=0$ are perpendicular.

(2) $3y-4=2x+3$ and $y-5=x+6$.

$3y-4=2x+3$ — (i).

$3y=2x+7$

$y=\frac{2}{3}x+\frac{7}{3}$

$m_1=\frac{2}{3}$

$y-5=x+6$ — (ii)

$y=x+11$

$m_2=1$

Since $m_1 \neq -\frac{1}{m_2}$.

The lines $3y-4=2x+3$ and $y-5=x+6$ are not perpendicular.

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$x^2 + y^2 + 3xy - 11 = 0$ $\quad x = 1, y = 2.$

$2x\,dx/dx + 2y\,dy/dx + 3(x \cdot 1\,dy/dx + 1 \cdot y\,dx/dx) - 0 = 0.$

$2x + 2y\,dy/dx + 3x\,dy/dx + 3 = 0.$

$2x\,dy/dx(2y + 3x) = -3 - 2x.$

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

$$\frac{dy}{dx} = \frac{-3 - 2(1)}{2(2) + 3(1)}$$

$$\frac{dy}{dx} = \frac{-5}{7}$$

EQUATION OF NORMAL

~~$y - y_1 = m(x - x_1)$~~ $y - y_1 = -1/m(x - x_1)$

$y - 2 = 7/5(x - 1)$

$y - 2 = 7/5x - 7/5.$

$5y - 10 = 7x - 7.$

$5y = 7x - 3$

EQUATION OF TANGENT

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

$y - 2 = -5/7(x - 1).$

$7y - 14 = -5x + 5$

$7y = -5x + 19$