Soln: $x^2 + y^2 + 3xy - 11 = 0 \quad (1,2)$

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

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

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

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

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

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

where $x = 1$ and $y = 2$

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

$= \frac{-(2+6)}{4+3} = \frac{-8}{7}$

$m = -8/7$

Equation of tangent: $y - y_1 = m(x - x_1)$

$y - 2 = -8/7(x - 1)$

$7(y - 2) = -8x + 8$

$7y - 14 = -8x + 8$

$8x + 7y - 14 - 8 = 0$

$8x + 7y - 22 = 0$ which is the equation of the tangent.

Equation of the normal: $y - y_1 = -1/m(x - x_1)$

$y - 2 = -1/-8/7\,(x - 1)$

$y - 2 = 7/8\,(x - 1)$

$8y - 16 = 7x - 7$

$8y - 7x - 16 + 7$

$8y - 7x + 9 = 0$ which is the equation of the norma

Name: Eshiet, Emmanuella Udiak

Department: MBBS

Matric No: 19/mhs01/160

Math Assignment Answers

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

$\Rightarrow y - 3x - 2 = 0$

$y = 3x + 2$

where $m_1 = 3$

$\Rightarrow 3y + x + 9 = 0$

$3y = -x - 9$

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

where $m_2 = -1/3$

$m_1 m_2 = -1$ if a a pair of lines are perpendicular to each other

$3 \times -1/3 = -1$

$\therefore y - 3x - 2 = 0$ and $3y + x + 9 = 0$ are perpendicular.

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

Soln: $3y - 4 = 2x + 3 \rightarrow 3y = 2x + 3 + 4$

$3y = 2x + 7$

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

$m_1 = 2/3$

$y - 5 = x + 6 \Rightarrow y = x + 6 + 5$

$y = x + 11$

$m = 1$

$m_1 m_2 = -1$ If a given pair of lines are perpendicular

$2/3 \times 1 > 2/3$

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

3. Equation of tangent and normal to $x^2 + y^2 + 8xy - 11 = 0$ at point $x = 1$, $y = 2$.