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MBBS

ASSIGNMENT 7

MATH 104

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

Let $T = y-3x-2=0$, $y = 3x+2$

Gradient, $m = dy/dx = 3$

$m_1 = 3$

Let $U = 3y+x+9=0$

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

$y = -x/3 - 3$

Gradient, $m_2 = dy/dx = -1/3$

$m_2 = -1/3$

$\therefore m_1 m_2 = -1$

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

Therefore, $y-3x-2=0$ is perpendicular to $3y+x+9=0$

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

Let $E = 3y = 2x+7$

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

$y = 2/3x + 7/3$

Gradient, $m_1 = dy/dx = 2/3$

Let $F = y-5 = x+6$

$y = x+11$

Gradient, $m_2 = dy/dx = 1$

$\therefore m_1 m_2 = -1$

$2/3 \times 1 \neq -1$

Therefore, $3y-4 = 2x+3$ and $y-5 = x+6$ is not perpendicular

2) $x^2 + y^2 + 3y - 11 = 0$ at point $(1, 2)$

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

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

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

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

Gradient, $m = dy/dx = \dfrac{-(2x+3y)}{2y+3x}$

When $x = 1$ and $y = 2$

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

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

$m = -8/7$

Equation of the tangent to a curve

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

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

$y - 2 = -8/7\,x + 8/7$

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

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

$7y + 8x + 6 = 0$

Equation of the normal to a curve

$m_1 m_2 = -1$

$-8/7\, m_2 = -1$

$m_2 = -1 \times 7/-8 = 7/8$

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

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

$y - 2 = 7/8\,x - 7/8$

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

$8y - 16 = 7x - 7$

$8y - 7x - 9 = 0$