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19/MHS01/231
MBBS

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

Let $A = y-3x-2=0$

$= dy/dx - 3 - 0 = 0$

$dy/dx = -3 = 0$ $dy/dx = 3$

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

$3\,dy/dx + 1 + 0 = 0$

$3\,dy/dx + 1 = 0$

$dy/dx = -1/3$

$\therefore A \perp B$

i.e $y - 2x - 2 = 0$ is perpendicular to $3y + x + 9 = 0$

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

Let $F = 3y - 4 = 2x + 3$

$3\,dy/dx - 0 = 2 + 0$

$3\,dy/dx = 2$

$dy/dx = 2/3$

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

$dy/dx - 0 = 1 + 0$

$dy/dx = 1$

$\therefore F \not\perp G$

i.e $3y - 4 = 2x + 3$ is not perpendicular to $y - 5 = x + 6$

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

$2x + 2y\,\frac{dy}{dx} + 3\left(x \times dy/dx + y \times 1\right) - 0 = 0$

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

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

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

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

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

when $x = 1$ and $y = 2$

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

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

$\therefore m = -8/7$

a Equation of the tangent to a curve

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

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

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

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

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

$8x + 7y - 22 = 0$

b Equation of the normal to a curve.

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

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

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

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

$8y - 16 = 7x - 7$

$8y = 7x - 7 + 16$

$7x - 8y + 9 = 0$