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making y subject of formula in 2

$y - 5 = x + 6$

$y = x + 6 + 5$

$y = x + 11$

By comparing with $y = mx + c$

$\therefore m_1 m_2 = -1$

$m_1 m_2 = \frac{3}{3} \times 1 = \frac{3}{3}$

$m_1 m_2 = -1$

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

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

$m = dy/dx$

$x^2 + y^2 + 3xy - 11 = 0$

dy/dx

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

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

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

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

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

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

$m = dy/dx \Big|_{x=1, y=2}$

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$= \frac{-2(1)-3(2)}{2(2)+3(1)} = \frac{-2-6}{4+3} = -8/7$

i) Equation of tangent

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

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

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

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

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

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

ii) Equation of normal

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

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

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

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

$8y - 16 = 7x - 7$

$8y - 7x - 16 + 7 = 0$

$8y - 7x - 9 = 0$ is the equation of normal.

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

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

$= \frac{dy}{dx} - 3 - 0 = 0$

$\frac{dy}{dx} - 3 = 0$

$= \frac{dy}{dx} = 3$

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

$3\frac{dy}{dx} + 1 + 0 = 0$

$3\frac{dy}{dx} + 1 = 0$

$\frac{dy}{dx} = -\frac{1}{3}$

$A + B$

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

2) $3y - 4 = 2x + 3$ (1) and $y - 5 = x + 6$ (2)

$y - 5 = x + 6 - (2)$

making y the subject of for formula in 1

$3y = 2x + 3 + 4$

$3y = 2x + 7$

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

$\therefore y = mx + c$

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