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Assignment

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

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

$3dy/dx + 1 = 0$

$dy/dx = -1/3$

$A \perp B$

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

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

let $A - 3y - 4 = 2x + 3$

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

$3dy/dx = 2$

$dy/dx = 2/3$

let $b = y - 5 = x + 6$

$dy/dx - 0 = 1 + 0$

$dy/dx = 1$

$\therefore A \not\perp B$

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

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

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

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

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

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

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

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

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

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

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

$m = \frac{-8}{7}$

Equation of the tangent of 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 the curve

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

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

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

$y - 2 = \frac{7x}{8} - 7/8$

$8y - 16 = 7x - 7$

$8y = 7x - 7 + 16$

$7x - 8y + 9 = 0$