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Assignment

Examine whether or not these pair of lines are perpendicular to each other

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

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

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

$dy/dx = -1/3$

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

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

$3\,dy/dx = 2$

$dy/dx = 2/3$

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

$dy/dx - 0 = 1+0$

$dy/dx = 1$

$\therefore A \neq B$

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

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

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

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

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

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

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

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

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

Equation of the tangent to a curve

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

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

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

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

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

$8x + 7y - 22 = 0$

Equation of the normal to a curve

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

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

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

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

$8y - 16 = 7x - 7$

$8y = 7x - 7 + 16$

$7x - 8y + 9 = 0$