MBATH PRECIOUS OBIANUJU
19/MHSA/243 , MATH04

2. 3y

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

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

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

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

$\frac{3dy}{dx} - 0 = 2+0$

$\frac{3dy}{dx} = 2$

$\frac{dy}{dx} = \frac{2}{3}$

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

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

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

$\therefore A = B$

$\therefore 3y-4=2x+8$ and $y-5=x+6$ is not perpendicular.

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

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

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

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

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

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

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

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

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

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

Equation of the tangent to a curve

$$y - y_1 = -\frac{1}{m}(x_1 - x_1)$$

$$y - 2 = \frac{-1}{-8/7}(x-1)$$

$$y - 2 = \frac{7}{8}(x-1)$$

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

$8y - 16 = 7x - 7$

$8y = 7x - 7 + 16$

$7x - 8y + 9 = 0$