(2)

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

sol

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

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

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

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

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

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

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

$\therefore$ C is not perpendicular to G

i.e $3y-4=2x+3$ is not perpendicular to $y-5=x+0$

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

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

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

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

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

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

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

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

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

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

Math 104

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19/MHS01

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

$\Rightarrow y - 3x - 2 = 0$ & $3y + x + 9 = 0$

$\Rightarrow 3y - 4 = 2x + 3$ & $y - 5 = x + 6$

2) find the equations of the tangent and normal to the curve $x^2 + y^2 + 3xy - 11 = 0$ at the point $x = 1, y = 2$

solution

$y - 3x - 2 = 0$ & $3y + x + 9 = 0$

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

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

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

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

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

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

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

$dy/dx = -1/3$

A is perpendicular to B

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

(a) equation of the tangent to the curve

$y_2 - y_1 = m(x_2 - x_1)$

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

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

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

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

$8x + 7y - 22 = 0$

Equation of the normal to a curve:

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

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

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

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

$8y - 16 = 7x - 7$

$8y = 7x - 7 + 16$

$7x - 8y + 9 = 0$