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Medicine

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

SOLUTION

$\Rightarrow y = 3x + 2$

$M = 3$

Eq2: $3y = -x - 9$

$y = \frac{-x}{3} - \frac{9}{3}$

$y = -\frac{1}{3}x - 3$

$y = mx + C$

$M_2 = -1/3$

$M_1 M_2 = -1/3 \times 3/1$

$= -1$

Since $M_1 M_2 = -1$, the lines are perpendicular.

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

SOLUTION

$3y = 2x + 7$

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

$M_1 = 2/3$

Eq 2: $y - 5 = x + 6$

$y = x + 11$

$M_2 = 1$

But for lines to be perpendicular,

$M_1 M_2 = -1$

$M_1 M_2 = 2/3 \times 1 = 2/3$

$M_1 M_2 \neq 1$

Hence the lines are not Perpendicular

3) Find Equation of tangent and curve: $x^2 + y^2 + 3xy - 11 = 0$ at point $x = 1, y = 2$

Solution:

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

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

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

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

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

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

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

$= \frac{-2-6}{4+3}$

$= -8/7$

a) Equation of tangent

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

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

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

$7y + 8x - 22 = 0$

b) Equation of normal

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

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

$8y - 16 = 7x - 7$

$8y - 7x - 9 = 0$