

Assignment 2.

dy/dx

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

$y - 3x - 2 = 0$

$y = 3x + 2$

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

$m_1 = 3$

solve

$3y + x + 9 = 0$

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

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

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

$\frac{dy}{dx} = -\frac{1}{3}$

$m_2 = -\frac{1}{3}$

If the lines are perpendicular, $m_1 m_2 = -1$

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

The lines are perpendicular.

2) a) $3y - 4 = 2x + 3$

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

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

$m_1 = \frac{2}{3}$

$y - 5 = 2x + 6$

$y = 2x + 11$

$y = x + 11$

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

$m_2 = 1$

If the lines are perpendicular, $m_1 m_2 = -1$

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

The lines are not perpendicular as $m_1 m_2$

$m_1 m_2 \neq -1$

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

solve

equation of tangent

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

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

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

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

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

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

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

$$x=1$$

$$y=2$$

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

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

$$m = -8/7$$

$$m = -8/7$$

equation of tangent = $y - y_1 = m(x - x_1)$

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

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

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

equation of tangent is $7y + 8x - 6 = 0$

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

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

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

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

$$8y - 16 = -7x + 7$$

$$8y + 7x - 16 - 7 = 0$$

$$8y + 7x - 23 = 0$$

$$8y + 7x - 9 = 0$$