2.) $3y-4=2x+3$ —i

$y-5=x+6$ —ii

Solution

$3y-2x=3+4$ —i

$3y-2x=7$

$3y=7+2x$

$3y=7+2x$

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

$m_1=2/3$

$y-5=x+6$

$y=x+11$

$m_2=1$

$m_1m_2=\frac{2}{3}\times 1=\frac{2}{3}$

And for two lines to be perpendicular $m_1m_2=-1$

$\therefore$ $3y-4=2x+3$ and $y-5=x+6$ are not perpendicular to each other

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

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

$2x + 2y\frac{dy}{dx} + 3\left[x\frac{dy}{dx} + y\cdot 1\right] = 0$

$2x + 2y\frac{dy}{dx} + 3\left[x\frac{dy}{dx} + y\right] = 0$

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

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

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

$m = \left.\frac{dy}{dx}\right|_{x=1, y=2} = \frac{-2x-3y}{2y+3x}$

$= \frac{-2(1)-3(2)}{2(2)+3(1)} = \frac{-2-6}{4+3}$

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

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

Equation of Tangent

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

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

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

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

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

$7y + 8x - 22 = 0$ is the required equation of Tangent

(b) Equation of normal

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

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

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

$8y - 16 = 7x - 7$

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

$8y - 7x - 9 = 0$ is the required equation of normal.

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1.) $y - 3x - 2 = 0$
$3y + x + 9 = 0$
Perpendicular lines $= m_1 m_2 = -1$
$y - 3x - 2 = 0$
$y = 3x + 2$
$m_1 = 3$
$3y + x + 9 = 0$
$3y = -x - 9$
$y = -x/3 - 9/3$
$y = -x/3 - 3$
$m_2 = -1/3$
$m_1 m_2 = 3 \times -1/3$
$m_1 m_2 = 1$
$\therefore y - 3x - 2 = 0$ and $3y + x + 9 = 0$ are perpendicular.