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a Find the equation of the tangent at the point (1,0) on the circle
$x^2+y^2-5x-y+4=0$

Solution

Given $x^2+y^2-5x-y+4=0$ at (1,0)
Using Implict differentiation.

$$2x + 2y\frac{dy}{dx} - 5 - \frac{dy}{dx} + 0 = 0$$

$$2y\frac{dy}{dx} - \frac{dy}{dx} = 5 - 2x$$

$$\therefore \left.\frac{dy}{dx}\right| = \frac{5-2x}{2y-1} \text{ at } (\overset{x}{1}, \overset{y}{0})$$

$$\frac{dy}{dx} = \frac{5-2(1)}{2(0)-1} = \frac{3}{-1}$$ Gradient(m) = -3 at (1,0)

Equation of the line is using equation of a straight line.

$y = mx + c \rightarrow$ Intercept of y.

$y - y_1 = m[x - x_1]$

$y - 0 = -3[x - 1]$

$y-0=-3x+3$

$y=-3x+3 \quad x=3 \quad c=+3$.

Question 2.

Given $x^2+y^2-12x-12y+47=0$ at $(1,0)$.

Using implict differentiation

$$2x\frac{dy}{dx} - 12\frac{dy}{dx} = 12-2x.$$

$$\frac{dy}{dx}[2y-12] = 12-2x.$$

$$dy/dx = \frac{12-2x}{2y-12} \quad at\ (1,0)$$

$$\frac{dy}{dx} = \frac{12-2(1)}{2(0)-12} = \frac{12-2}{-12} = \frac{10}{-12} = \frac{-5}{6}$$

$m = -5/6$ at $(1,0)$.

equation of line $y-y_1 = m[x-x_1]$

$$y-0 = -5/6\,[x-1]$$

$$y = -5x/6 + 5/6.$$

Question 3

$x^2+y^2-8x+14y+40=0$.

Using implict differentiation.

$$2x+2y\,dy/dx - 8 + 14\,dy/dx + 0 = 0.$$

$$\frac{dy}{dx}[2y+14] = 8-2x$$

$$\frac{dy}{dx} = \frac{8-2x}{2y+14} \quad at\ (1,0).$$

$$\frac{dy}{dx} = \frac{8-2(1)}{2(0)+14} = \frac{8-2}{14} = \frac{6}{14} = \frac{3}{7}$$

$m = 3/7$ at $(1,0)$.

equation of line $y-y_1 = m[x-x_1]$

$$y-0 = 3/7\,[x-1], \quad y = \frac{3x}{7} - \frac{3}{7}$$