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1. $x^2 + y^2 - 5x - y + 4 = 0$

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

Comparing both equations

$$2gx = -5x$$

$$g = -5/2$$

$$2fy = -y$$

$$f = -1/2$$

$$(g, f) = (-5/2, -1/2) \quad x_1, y_1 = (1, 0)$$

Using eqn of a tangent

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

$$\therefore m = -\frac{(x_1 + g)}{y_1 + f}$$

$$m = -\frac{(1 + (-5/2))}{0 + (-1/2)} = -\left(\frac{3/2}{-1/2}\right) = -\left(\frac{3 \times -2}{-1 \times 2}\right)$$

$$m = -3$$

$$y - 0 = -3(x - 1)$$

$$y = -3x + 3$$

$$y + 3x - 3 = 0$$

2. $x^2 + y^2 - 12x - 12y + 47 = 0$

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

Comparing both equations:

$$2gx = -12x$$

$$g = -6$$

$$2fy = -12y$$

$$f = -6$$

$$(g, f) = (-6, -6) \quad x_1, y_1 = (1, 0)$$

Using eqn of tangent

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

$$\therefore m = -\frac{(x_1 + y_1)}{y_1 + f}$$

$$m = -\frac{(1 + (-6))}{0 + (-6)} = \frac{+5}{-6} = -\frac{5}{6}$$

$$y - 0 = \frac{-5}{6}(x - 1)$$

$$y = \frac{-5(x-1)}{6}$$

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

$$6y + 5x - 5 = 0$$

$$3 > x^2 + y^2 - 8x + 14y + 40 = 0$$

$$x^2 + y^2 + 2gx + 2fy + c = 0$$

Comparing both equations.

$$2gx = -8x$$

$$g = -4$$

$$2fy = 14y$$

$$f = 7$$

$$(g, f) = (-4, 7)$$

$$(x, y) = (1, 0)$$

Using eqn of tangent

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

$$\therefore m = -\frac{(x_1 + y_1)}{y_1 + f}$$

$$m = -\frac{(1 + (-4))}{0 + 7} = \frac{3}{7}$$

$$y - 0 = \frac{3}{7}(x - 1)$$

$$y = \frac{3}{7}(x - 1)$$

$$\therefore \text{Eqn of tangent} = 7y - 3x + 3 = 0$$