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MATRIC NO: 19/ENAO7/012

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

Solution

$$x_1 = 1, \quad y_1 = 0$$

Given the equation

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

Comparing with general equation formula

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

$$2g = -5$$

$$g = -5/2$$

$$2f = -1$$

$$f = -1/2$$

$$c = 4$$

Equation of tangent to the circle is

$$xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$$

$$x(1) + y(0) + (-5/2)(x+1) + (-1/2)(y+0) + 4 = 0$$

$$2x - 5x - 5 - y + 8 = 0$$

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

∴ The equation required is

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

2. Find the equation of the tangent at the point $(1, 0)$ on the circle ~~$x^2 + y^2 - 8x + 11y + 4 = 0$~~
 $x^2 + y^2 - 12x - 12y + 47 = 0$.

Solution

Given the equation

$$x^2 + y^2 - 12x - 14y + 47 = 0$$

$$x_1 = 1, \quad y_1 = 0$$

Comparing equation given with general formula.

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

$$2g = -12 \quad ; \quad g = -6$$

$$2f = -14 \quad ; \quad f = -7$$

$$c = 47$$

Equation of a tangent is

$$xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$$

$$x(1) + y(0) + -6(x+1) + -6(y+0) + 47 = 0$$

$$x - 6x - 6 - 6y + 47 = 0$$

$$\Rightarrow -5x - 6y + 41 = 0$$

\therefore The equation required is

$$5x + 6y - 41$$

3 Find the equation of the tangent at the point $(1, 0)$
on the circle $x^2 + y^2 - 8x + 14y + 40 = 0$

Solution

$$x_1 = 1, \quad y_1 = 0$$

Given the equation

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

Comparing with general equation formula

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

$$\begin{aligned} 2g &= -8 & ; & & f_g &= -4 \\ 2f &= 14 & ; & & f &= 7 \end{aligned}$$

Equation of a tangent is

$$xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$$

$$x(1) + y(0) + 7(x+1) + 7(y+0) + 40 = 0$$

$$x - 4x - 4 + 7y + 40 = 0$$

$$\Rightarrow -3x + 7y + 36 = 0$$

∴ The equation required is

$$3x - 7y - 36 = 0$$