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DEPARTMENT: COMPUTER SCIENCE

MATRIC NUMBER: 19/SCI01/015

ASSIGNMENT

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

Solution

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

Comparing the given equation to $x^2+y^2+2gx+2fy+c=0$

$$\frac{2gx}{2x} = \frac{-5x}{2x}$$

$$g = -5/2$$

$$\frac{2fy}{2y} = \frac{-y}{2y}$$

$$f = -1/2$$

$(x_1, y_1) = (1,0)$

Using equation of the tangent at point (1,0)

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

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

$$y - y_1 = \left[\frac{-(x_1+g)}{y_1+f}\right](x - x_1)$$

$$y - 0 = \left[\frac{-(1+(-5/2))}{0+(-1/2)}\right](x-1)$$

$$y = \left[\frac{-(1-5/2)}{-1/2}\right](x-1)$$

$$y = \left[-\left(\frac{1}{1}-\frac{5}{2}\right) \div \frac{-1}{2}\right](x-1)$$

$$y = \left[+\left[\frac{2-5}{2}\right] \times \frac{2}{+1}\right]$$

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

$y = -3x + 3$

$y + 3x - 3 = 0$

∴ Equation of the tangent $= y + 3x - 3 = 0$

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

Solution

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

Comparing the given equation to $x^2 + y^2 + 2gx + 2fy + c = 0$

$\frac{2gx}{2x} = \frac{-12x}{2x}$

$g = -6$

$\frac{2fy}{2y} = \frac{-12y}{2y}$

$f = -6$

$(x_1, y_1) = (1,0)$

Using equation of the tangent at point $(1,0)$

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

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

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

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

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

$m = -\frac{5}{6}$

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

$y = \frac{-5x}{6} + \frac{5}{6} = \frac{-5x + 5}{6}$

$y = -\frac{5x+5}{6}$

$6y = -5x + 5$

$6y + 5x - 5 = 0$

∴ Equation of the tangent = $6y + 5x - 5 = 0$

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

Solution

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

Comparing the given equation to $x^2 + y^2 + 2gx + 2fy + c = 0$

$\frac{2gx}{2x} = \frac{-8x}{2x}$

$g = -4$

$\frac{2fy}{2y} = \frac{14y}{2y}$

$f = 7$

$(x_1, y_1) = (1, 0)$

Using equation of the tangent at point (1,0)

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

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

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

$m = \frac{3}{7}$

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

$y = \frac{3x}{7} - \frac{3}{7} = \frac{3x-3}{7}$

$y = \frac{3x-3}{7} \Rightarrow 7y = 3x - 3$

∴ Equation of the tangent = $7y - 3x + 3 = 0$