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MECHATRONICS ENGINEERING

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Find the equation of the tangent at a point (1,0) on the circle

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

solution

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

Comparing to equation of a circle; $x^2+y^2+2gx+2fy+c=0$

$2gx = -5x$

$g = -5/2$

$2fy = -y$

$f = -1/2$

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

using equation of a tangent at point (1,0)

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

$$y-0 = \frac{-(1-5/2)}{0-1/2}(x-1)$$

$$y = \frac{+(-3/2)}{+1/2}(x-1)$$

$$y = -\frac{3}{2} \times 2\,(x-1)$$

$y = -3(x-1)$

$y = -3x+3$

$y+3x-3=0$

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 to equation of a circle: $x^2+y^2+2gx+2fy+c=0$

$2gx = -12x$

$g = -6$

$2fy = -12$

$f = -6$

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

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

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

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

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

$$y+\frac{5x}{6}-\frac{5}{6}=0$$

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 to equation of a circle; $x^2+y^2+2gx+2fy+c=0$

$2gx = -8x$

$g = -4$

$2fy = 14y$

$f = 7$

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

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

$$y - 0 = \frac{-(1-4)}{0+7}(x-1)$$

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

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

$$y - \frac{3}{7}x + \frac{3}{7} = 0$$