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

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

Solution

Compare the equation above to $x^2+y^2+2gx+2fy+c=0$

$\therefore$

$$2gx=-5x \qquad 2fy=-y$$

$$g=\frac{-5\cancel{x}}{2\cancel{x}} \qquad f=\frac{-\cancel{y}}{2\cancel{y}} \qquad C=+4$$

$$g=-5/2 \qquad f=-1/2$$

The equation of the tangent at (1,0) is

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

$$xx_1+yy_1-\frac{5}{2}(x+x_1)-\frac{1}{2}(y+y_1)+4=0$$

$$x(1)+y(0)-\frac{5}{2}(x+1)-\frac{1}{2}(y+0)+4=0$$

$$x-\frac{5x}{2}-\frac{5}{2}-\frac{y}{2}+4=0$$

multiply through by 2

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

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

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

$$y=-3x+3$$

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

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

Solution

Comparing the equation above to the equation of a tangent

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

$2gx=-12x \quad 2fy=-12y \quad c=47$

$g=\cancel{\frac{-12x}{2x}} \quad f=\cancel{\frac{-12y}{2y}}$

$g=-6 \quad y=-6$

The equation of the tangent at (1,0) is

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

$xx_1+yy_1-6(x+x_1)-6(y+y_1)+47=0$

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

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

$-5x-6y+47-6=0$

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

$-6y=5x-41$

$y=-\frac{5x+41}{6}$

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

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

Solution

Comparing the above equation to the equation of a tangent

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

$2gx = -8x \quad 2fy = 14y \quad c = 40$

$g = \frac{-8\cancel{x}}{2\cancel{x}} \quad f = \frac{14\cancel{y}}{2\cancel{y}}$

$g = -4 \quad f = 7$

The equation of the tangent at $(1,0)$ is

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

$xx_1 + yy_1 - 4(x + x_1) + 7(y + y_1) + c = 0$

$x(1) + y(0) - 4(x + 1) + 7(y + 0) + 40 = 0$

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

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

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

$7y = 3x - 36$

$y = \frac{3x - 36}{7}$