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DEPARTMENT: COMPUTER SCIENCES  
COURSE: MAT 102 ASSIGNMENT  
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1. Find the equation of the tangent at the point  $(1, 0)$  on the circle

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

Soln

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

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

$$\left(x - \frac{5}{2}\right)^2 - \frac{25}{4} + \left(y - \frac{1}{2}\right)^2 - \frac{1}{4} + 4 = 0$$

$$\left(x - \frac{5}{2}\right)^2 + \left(y - \frac{1}{2}\right)^2 = \frac{5}{2}$$

Centre  $\left(\frac{5}{2}, \frac{1}{2}\right)$ , radius  $\sqrt{\frac{5}{2}}$

$$\text{Gradient of the circle} = \frac{0 - \frac{1}{2}}{1 - \frac{5}{2}} = \frac{-\frac{1}{2}}{-\frac{3}{2}}$$

Gradient of the tangent =  $-3$

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

$\therefore$  Equation of the tangent is  $y - 0 = -3(x - 1)$

$$y = -3x + 3$$

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

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

$$(x - 6)^2 - 36 + (y - 6)^2 - 36 + 47 = 0$$

$$(x - 6)^2 + (y - 6)^2 = 25$$

Centre  $(6, 6)$ , radius =  $\sqrt{25} = 5$

$$\text{Gradient of the circle} = \frac{0 - 6}{1 - 6} = \frac{-6}{-5} = \frac{6}{5}$$

$$\text{Gradient of the tangent} = -5/6$$

$$\text{Recall, } y - y_1 = m(x - x_1)$$

$$\therefore \text{Equation of the tangent is } y - 0 = -5/6(x - 1)$$

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

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

$$(x - 4)^2 - 16 + (y + 7)^2 - 49 + 40 = 0$$

$$(x - 4)^2 + (y + 7)^2 = 25$$

$$\text{Centre } (4, -7), \text{ radius} = \sqrt{25} = 5$$

$$\text{Gradient of the circle} = \frac{0 - (-7)}{1 - 4} = \frac{0 + 7}{1 - 4}$$

$$= 7/3$$

$$\text{Gradient of the tangent} = 3/7$$

$$\text{Recall, } y - y_1 = m(x - x_1)$$

$$\therefore \text{Equation of the tangent is } y - 0 = 3/7(x - 1)$$

$$7y = 3x - 3$$