

OMOLUABI SEAN SEREMI

MAT 102

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

$$x^2 + y^2 - 5x - y = -4 \Rightarrow x^2 - 5x + y^2 - y = -4$$

$$x^2 - 5x + 0$$

$$y^2 - y + 0$$

$$= a(x+d)^2 + e$$

$$= a(x+d)^2 + e$$

$$d = b/2a = -5/2$$

$$d = b/2a = -1/2$$

$$e = c - b^2/4a = -25/4$$

$$e = c - b^2/4a = -1/4$$

$$\therefore x^2 - 5x = (x + (-5/2))^2 - 25/4$$

$$\therefore y^2 - y = (y + (-1/2))^2 - 1/4$$

$$(x - 5/2)^2 - 25/4$$

$$(y - 1/2)^2 - 1/4$$

$$x^2 + y^2 - 5x - y = -4 \Rightarrow (x - 5/2)^2 + (y - 1/2)^2 - 25/4 - 1/4 = -4$$

$$(x - 5/2)^2 + (y - 1/2)^2 = -4 + 26/4 = 2.5$$

$$h = -5/2, k = -1/2, r = 2.5$$

$$\text{center} = (-5/2, -1/2)$$

$$m_1 = [0 - (-1/2)] / [1 - (-5/2)] = 1/7$$

$$m_1 m_2 = -1$$

$$\therefore m_2 = -1/m_1 = -1 / (1/7) = -7$$

$$\therefore \text{equation of tangent} \Rightarrow y = m_2 x + b \Rightarrow y = -7x + b$$

$$\text{at } (1,0),$$

$$0 = -7 \times 1 + b$$

$$b = 7$$

$$\therefore y = -7x + 7$$

$$(2) x^2 + y^2 - 12x - 12y + 47 = 0 \Rightarrow x^2 + y^2 - 12x - 12y = -47$$

$$= x^2 - 12x + y^2 - 12y = -47 \quad \text{at } (1, 0)$$

$$x^2 - 12x + 0$$

$$y^2 - 12y + 0$$

$$= a(x+d)^2 + e$$

$$= a(x+d)^2 + e$$

$$d = b/2a = -12/2 = -6$$

$$d = b/2a = -12/2 = -6$$

$$e = c - b^2/4a = -144/4 = -36$$

$$e = c - b^2/4a = -144/4 = -36$$

$$\therefore x^2 - 12x = (x-6)^2 - 36$$

$$\therefore y^2 - 12y = (y-6)^2 - 36$$

$$x^2 + y^2 - 12x - 12y = -47 \Rightarrow (x-6)^2 - 36 + (y-6)^2 - 36 = -47$$

$$(x-6)^2 + (y-6)^2 = -47 + 72 = 25$$

$$h = -6, k = -6, r = 25$$

$$\text{at } (1, 0), m_1 = \frac{0 - (-6)}{1 - (-6)} = \frac{6}{7}$$

$$m_1 = \frac{6}{7}$$

$$m_1 m_2 = -1 \Rightarrow \frac{6}{7} m_2 = -1$$

$$\therefore m_2 = -7/6$$

$$\text{equation of tangent } \Rightarrow y = m_2 x + b \Rightarrow y = -7/6 x + b$$

at $(1, 0)$.

$$0 = -7/6(1) + b$$

$$b = 7/6$$

$$\therefore y = m_2 x + b \Rightarrow y = -7/6 x + 7/6 \parallel$$

$$(3) x^2 + y^2 - 8x + 14y + 40 = 0 \Rightarrow x^2 + y^2 - 8x + 14y = -40$$

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

$$x^2 - 8x + 0$$

$$y^2 + 14y + 0$$

$$a(x+d)^2 + e$$

$$a(x+d)^2 + e$$

$$d = b/2a = -8/2 = -4$$

$$d = b/2a = 14/2 = 7$$

$$e = c - b^2/4a = -64/4 = -16$$

$$e = c - b^2/4a = -196/4 = -49$$

$$x^2 - 8x = (x-4)^2 - 16$$

$$y^2 + 14y = (y+7)^2 - 49$$

$$x^2 - 8x + y^2 + 14y = -40 \Rightarrow (x-4)^2 + (y+7)^2 - 16 - 49 = -40$$

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

$$h = -4, k = 7, r = \sqrt{7}$$

$$\text{at } (1,0) m_1 = \frac{0-7}{1-4} = \frac{-7}{-3} = \frac{7}{3}$$

$$m_2 = -\frac{3}{7}$$

$$m_1 m_2 = -1 \Rightarrow \frac{7}{3} m_2 = -1$$

$$m_2 = -\frac{3}{7}$$

$$\therefore \text{equation of tangent} \Rightarrow y = m_2 x + b = y = -\frac{3}{7}x + b$$

$$\text{at } (1,0), y = -\frac{3}{7}x + b = 0 = -\frac{3}{7} \times 1 + b$$

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

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