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19/ENG-06/042 MAT102

26  
16  
10  
4

$$x^2 + y^2 - 5x - y + 4 = 0 \text{ at } (3, 2)$$

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

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

$$\Rightarrow \left(x - \frac{5}{2}\right)^2 + \left(y - \frac{1}{2}\right)^2 = \frac{25}{4} + \frac{1}{4} - \frac{16}{4}$$

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

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

~~gradient  $\Rightarrow \frac{1 - \frac{1}{2}}{3 - \frac{5}{2}} \Rightarrow \frac{3}{2} \div \frac{11}{2}$~~

~~$\Rightarrow \frac{3}{2} \div \frac{11}{2}$~~

~~$\therefore \text{gradient of tangent} = \frac{11}{3}$~~

gradient  $\Rightarrow \frac{0 - \frac{1}{2}}{1 - \frac{5}{2}} \Rightarrow \frac{-\frac{1}{2}}{\frac{1}{2}} \div \frac{-3}{2}$

$\Rightarrow \frac{1}{3}$

gradient of tangent  $\Rightarrow -3$

∴ equation of tangent at P(1, 0).

$$y - 0 = -3(x - 1)$$

$$\Rightarrow y = -3x + 3$$

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

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

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

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

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

∴ centre = (6, 6) radius = 5

$$\text{gradient} = \frac{0-6}{1-6} \Rightarrow \frac{-6}{-5} \Rightarrow \frac{6}{5}$$

∴ gradient of the tangent  $\Rightarrow \frac{-5}{6}$

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

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

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

$$\therefore 6y + 5x - 5 = 0$$

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

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

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

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

$$\therefore \text{centre} = (4, -7).$$

$$\text{gradient} = \frac{(0 - (-7))}{1 - 4} \Rightarrow \frac{7}{-3}$$

$$\text{gradient of tangent} \Rightarrow \frac{3}{7}.$$

$$\therefore \text{equation} \Rightarrow y - 0 = \frac{3}{7} (x - 1).$$

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

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