

$$M_{AC} = C - A = (0, -2)$$

$$L = \frac{AC}{2} = (-1, 2)$$

$$\begin{aligned} 0 \cdot x - 2y + c &= 0 \\ -2 \cdot (-2) + c &= 0 \\ -4 + c &= 0 \\ c &= 4 \end{aligned}$$

$$\begin{aligned} -2y + 4 &= 0 \\ -y + 2 &= 0 \end{aligned}$$

$$S: \begin{aligned} x + y - 1 &= 0 \\ -y + 2 &= 0 \\ \hline x + 1 &= 0 \\ x &= -1 \end{aligned}$$

$$\begin{aligned} -1 + y - 1 &= 0 \\ y &= 2 \end{aligned}$$

$$S(-1, 2)$$

$$\vec{SA} = A - S = (-1 + 1, 3 - 2) = (0, 1)$$

$$SA = \sqrt{0^2 + 1^2} = \sqrt{1}$$

$$\underline{(x+1)^2 + (y-2)^2 = 1}$$

Ex. 3

$$\begin{aligned} x^2 - 14x + y^2 - 4y + 49 &= 0 \\ (x^2 - 14x + 49) - 49 + (y^2 - 4y + 4) - 4 + 49 &= 0 \\ \underline{(x-7)^2 + (y-2)^2 = 4} \end{aligned}$$

$$\Rightarrow S(7, 2), T(7, 4)$$

$$\vec{ST} \cdot \vec{TM} = 0$$

$$\vec{ST} = T - S = (0, 2); \vec{TM} = M - T = (x-7, y-4)$$

$$\Rightarrow 0 \cdot (x-7) + 2 \cdot (y-4) = 0$$

$$2y - 8 = 0$$

$$2y = 8$$

$$\underline{y = 4}$$

Ex. 4

$$\begin{aligned} x^2 - x + y^2 - 3y - 2 &= 0 \\ (x^2 - x + \frac{1}{4}) - \frac{1}{4} + (y^2 - 3y + \frac{9}{4}) - \frac{9}{4} - 2 &= 0 \\ (x - \frac{1}{2})^2 + (y - \frac{3}{2})^2 - \frac{10}{4} - \frac{8}{4} &= 0 \\ \underline{(x - \frac{1}{2})^2 + (y - \frac{3}{2})^2 = \frac{9}{2}} \end{aligned}$$

$$\Rightarrow S(\frac{1}{2}, \frac{3}{2}), T(2, 3)$$

$$\vec{ST} \cdot \vec{TM} = 0$$

$$\vec{ST} = T - S = (\frac{3}{2}, \frac{3}{2}); \vec{TM} = M - T = (x-2, y-3)$$

$$\Rightarrow \frac{3}{2} \cdot (x-2) + \frac{3}{2} \cdot (y-3) = 0$$

$$\frac{3}{2}x - 3 + \frac{3}{2}y - \frac{9}{2} = 0 \quad / \cdot 2$$

$$3x - 6 + 3y - 9 = 0 \quad / \cdot 3$$

$$x - 2 + y - 3 = 0$$

$$\underline{x + y - 5 = 0}$$