

$$12. \quad x^2 + y^2 = 16 \rightarrow (1)$$

$$y + 2x = -1 \rightarrow (2)$$

$$y = -1 - 2x$$

substitute y in eqn (1)

$$x^2 + (-1 - 2x)^2 = 16$$

$$x^2 + (1 + 4x + 4x^2) = 16$$

$$x^2 + 4x^2 + 4x + 1 = 16$$

$$5x^2 + 4x = 15$$

$$5x^2 + 4x - 15 = 0$$

$$x = \frac{-4 \pm \sqrt{16 - (4 \times 5 \times -15)}}{2 \times 5} \Rightarrow \frac{-4 \pm \sqrt{79}}{10}$$

$$x = \frac{-2}{5} - \frac{\sqrt{79}}{5}, \frac{\sqrt{79}}{5} - \frac{2}{5}$$

$$y = -1 - 2\left(\frac{-2}{5} - \frac{\sqrt{79}}{5}\right) \Rightarrow \frac{2\sqrt{79}}{5} - \frac{1}{5}$$

$$\Rightarrow -1 - 2\left(\frac{-2}{5} + \frac{\sqrt{79}}{5}\right) = -\frac{1}{5} - \frac{2\sqrt{79}}{5}$$

therefore:

$$x = \frac{-2}{5} - \frac{\sqrt{79}}{5}, y = \frac{2\sqrt{79}}{5} - \frac{1}{5}$$

$$x = \frac{-2}{5} + \frac{\sqrt{79}}{5}, y = -\frac{1}{5} - \frac{2\sqrt{79}}{5}$$