Conic Sections

11^{th} Maths - Chapter 11

This is Problem-3 from Exercise 1

1. Find the equation of circle with centre $(\frac{1}{2}, \frac{1}{4})$ and radius $\frac{1}{12}$ Solution: Given,

$$\mathbf{c} = \begin{pmatrix} \frac{1}{2} \\ \frac{1}{4} \end{pmatrix} \text{ and } r = \frac{1}{12} \tag{1}$$

The equation of a circle is given by

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^{\mathsf{T}}\mathbf{x} + f = 0 \tag{2}$$

where

$$\mathbf{u} = -\mathbf{c} \tag{3}$$

$$= \begin{pmatrix} -\frac{1}{2} \\ -\frac{1}{4} \end{pmatrix} \tag{4}$$

$$f = \|\mathbf{u}\|^2 - r^2 \tag{5}$$

$$=\frac{11}{36}\tag{6}$$

Then substituting them in (2) gives the equation of circle

$$\|\mathbf{x}\|^2 + (-1 - \frac{1}{2})\mathbf{x} + \frac{11}{36} = 0$$
 (7)

