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

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

   where

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

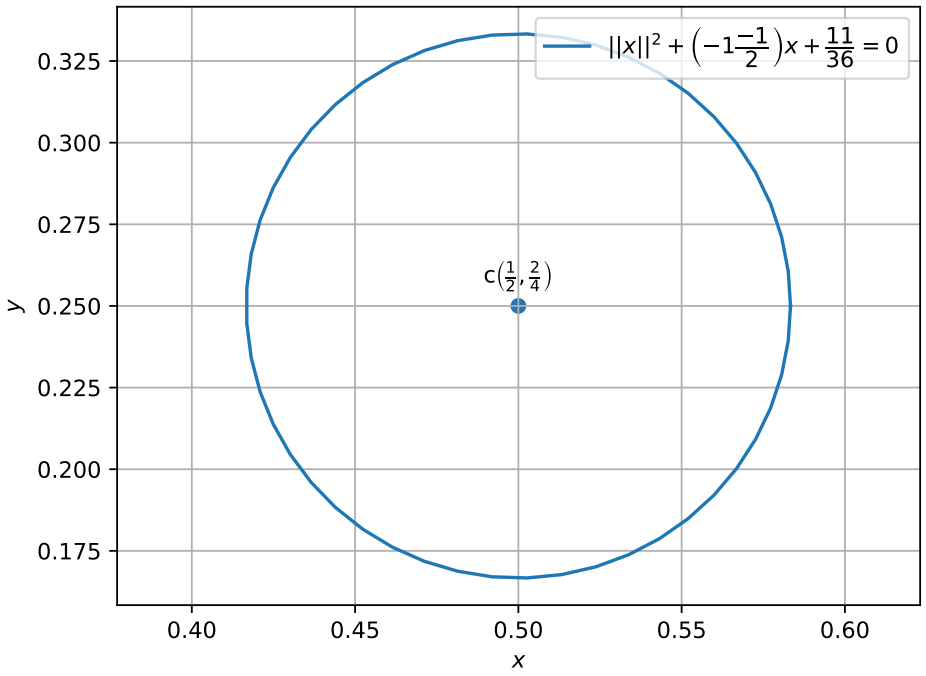
$$= \begin{pmatrix} \frac{-1}{2} \\ \frac{-1}{4} \end{pmatrix} \tag{4}$$

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

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

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

$$\|\mathbf{x}\|^2 + \begin{pmatrix} -1 & \frac{-1}{2} \end{pmatrix} \mathbf{x} + \frac{11}{36} = 0 \tag{7}$$


$||x||^2 + \left(-1\frac{-1}{2}\right)x + \frac{11}{36} = 0$
0.325
0.300
0.275
0.250
0.225
0.200
0.175
y
c$\left(\frac{1}{2}, \frac{2}{4}\right)$
0.40
0.45
0.50
0.55
0.60
x