

Assignment-4

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Abstract—This document contains solution of Problem Ramsey(4.1.4) From Eq (2.0.2),

Download latex-tikz codes from

https://github.com/Hrithikraj2/MatrixTheory_EE5609/blob/master/Assignment_4/A4.tex

$$\Rightarrow r = \sqrt{(2^2 + (-1)^2) - \frac{11}{3}} \quad (2.0.9)$$

$$= \sqrt{4 + 1 - \frac{11}{3}} \quad (2.0.10)$$

$$= \sqrt{\frac{4}{3}} \quad (2.0.11)$$

From Eq (2.0.7) and Eq (2.0.11)

$$\mathbf{c} = \begin{pmatrix} 2 \\ -1 \end{pmatrix} \quad (2.0.12)$$

$$r = \sqrt{\frac{4}{3}} \quad (2.0.13)$$

Python Code to verify the result,

https://github.com/Hrithikraj2/MatrixTheory_EE5609/blob/master/Assignment_4/A4.py

1 QUESTION

Find the radius and the coordinates of the center of the following circle

$$3\mathbf{x}^T \mathbf{x} + \begin{pmatrix} -12 & 6 \end{pmatrix} \mathbf{x} + 11 = 0$$

2 SOLUTION

The general equation of circle can be expressed as

$$\mathbf{x}^T \mathbf{x} - 2\mathbf{c}^T \mathbf{x} + f = 0 \quad (2.0.1)$$

where \mathbf{c} is the centre of the circle and radius of the circle is given as

$$r = \sqrt{\|\mathbf{c}\|^2 - f} \quad (2.0.2)$$

Given equation is

$$3\mathbf{x}^T \mathbf{x} + \begin{pmatrix} -12 & 6 \end{pmatrix} \mathbf{x} + 11 = 0 \quad (2.0.3)$$

$$\mathbf{x}^T \mathbf{x} + \begin{pmatrix} -4 & 2 \end{pmatrix} \mathbf{x} + \frac{11}{3} = 0 \quad (2.0.4)$$

$$\mathbf{x}^T \mathbf{x} - 2 \begin{pmatrix} 2 & -1 \end{pmatrix} \mathbf{x} + \frac{11}{3} = 0 \quad (2.0.5)$$

Compare Eq (2.0.1) and Eq (2.0.5)

$$\Rightarrow \mathbf{c}^T = \begin{pmatrix} 2 & -1 \end{pmatrix} \quad (2.0.6)$$

$$\Rightarrow \mathbf{c} = \begin{pmatrix} 2 \\ -1 \end{pmatrix} \quad (2.0.7)$$

$$f = \frac{11}{3} \quad (2.0.8)$$

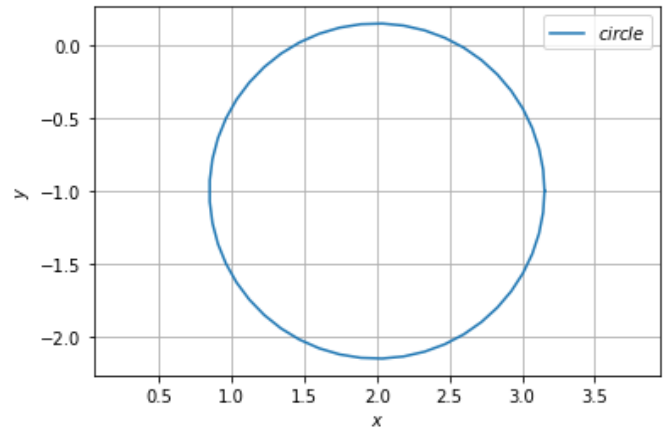


Fig. 0: Circle with radius 1.154 and center coordinates (2,-1)