

Assignment 3

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Download all python codes from

<https://github.com/YashasTadikamalla/EE3900/blob/main/Assignment3/codes>

and latex-tikz codes from

<https://github.com/YashasTadikamalla/EE3900/blob/main/Assignment3/Assignment3.tex>

1 PROBLEM (RAMSEY/4.4 SYSTEMS OF CIRCLES/Q4 (A))

Write down the equation of the radical axis of the following pair of circles:

$$\mathbf{x}^T \mathbf{x} - \begin{pmatrix} 4 & -5 \end{pmatrix} \mathbf{x} - 2 = 0$$

$$\mathbf{x}^T \mathbf{x} - \begin{pmatrix} 5 & -6 \end{pmatrix} \mathbf{x} = 0$$

2 SOLUTION

Given, two circles with equations,

$$S = \mathbf{x}^T \mathbf{x} - \begin{pmatrix} 4 & -5 \end{pmatrix} \mathbf{x} - 2 = 0 \quad (2.0.1)$$

$$S' = \mathbf{x}^T \mathbf{x} - \begin{pmatrix} 5 & -6 \end{pmatrix} \mathbf{x} = 0 \quad (2.0.2)$$

We know, the radical axis for the pair of circles, $S = 0, S' = 0$ is given by $L = S - S' = 0$.

Using (2.0.1), (2.0.2), the required equation is

$$\left(\mathbf{x}^T \mathbf{x} - \begin{pmatrix} 4 & -5 \end{pmatrix} \mathbf{x} - 2 \right) - \left(\mathbf{x}^T \mathbf{x} - \begin{pmatrix} 5 & -6 \end{pmatrix} \mathbf{x} \right) = 0 \quad (2.0.3)$$

$$\begin{pmatrix} 1 & -1 \end{pmatrix} \mathbf{x} - 2 = 0 \quad (2.0.4)$$

$\therefore L = \begin{pmatrix} 1 & -1 \end{pmatrix} \mathbf{x} - 2 = 0$ is the equation of the required radical axis.

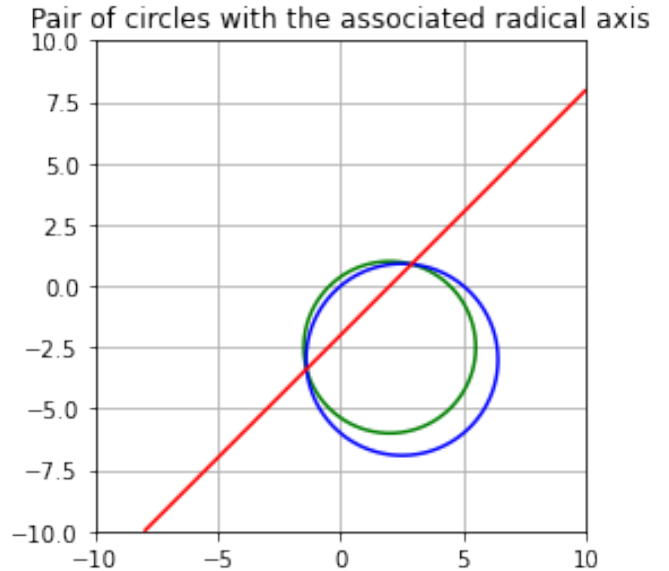


Fig. 0: $S=0$ (Green), $S'=0$ (Blue), $L=0$ (Red)