ASSIGNMENT 4

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Download all python codes from

https://github.com/Dishank422/EE3900/blob/main/assignment4/codes

and latex-tikz codes from

https://github.com/Dishank422/EE3900/blob/main/assignment4/Assignment4.tex

1 Ramsey 1.2 Loci Q 4

A point moves so that it's distance from the y-axis is equal to the distance from the point $\begin{pmatrix}2\\1\end{pmatrix}$. Find the equation of the locus.

2 Solution

Let $\mathbf{A} = \begin{pmatrix}x\\y\end{pmatrix}$ be the point. The equation of y-axis is given by

$$\mathbf{R} = \lambda\begin{pmatrix}0\\1\end{pmatrix} \tag{2.0.1}$$

AR is perpendicular to y-axis.

$$\implies (\mathbf{R}-\mathbf{A})\cdot\mathbf{R} = 0 \tag{2.0.2}$$
$$\implies (\lambda - y)\times\lambda = 0 \tag{2.0.3}$$
$$\implies \lambda = y \tag{2.0.4}$$

$$AR = \|\mathbf{A}-\mathbf{R}\| \tag{2.0.5}$$
$$= \sqrt{((x-0)^2+(y-y)^2)} \tag{2.0.6}$$
$$= x \tag{2.0.7}$$

Let $\mathbf{C} = \begin{pmatrix}2\\1\end{pmatrix}$. Then

$$AC = \|\mathbf{A}-\mathbf{C}\| \tag{2.0.8}$$
$$= \sqrt{((x-2)^2+(y-1)^2)} \tag{2.0.9}$$

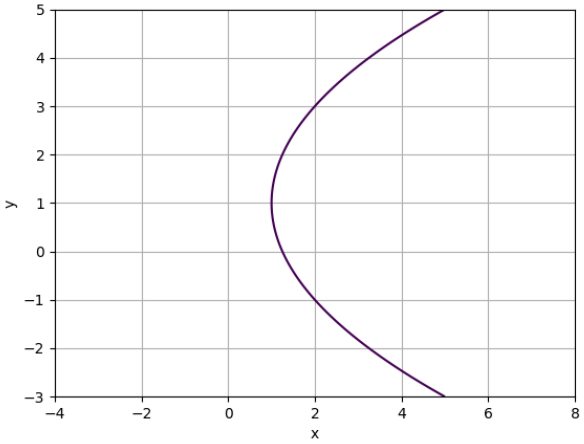

Fig. 0: Plot of the locus

We are given AR = AC.

$$\implies x = \sqrt{((x-2)^2+(y-1)^2)} \tag{2.0.10}$$
$$\implies x^2 = x^2 - 4x + 4 + y^2 - 2y + 1 \tag{2.0.11}$$
$$\implies y^2 = 4x + 2y - 5 \tag{2.0.12}$$

Therefore 2.0.12 is the required locus.