Assignment 5

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Download the python codes from:

https://github.com/tanayyadav28/EE3900–Assignments/blob/main/Assignment_5/code/Assignment_5.py

Download the latex-tikz codes from:

https://github.com/tanayyadav28/EE3900–Assignments/blob/main/Assignment_5/Assignment_5.tex

1 Problem

[Quadratic Forms 2.22] Solve:

$$x^2 + x + 1 = 0 \tag{1.0.1}$$

2 Solution

Let

$$y = x^2 + x + 1 = 0 \tag{2.0.1}$$

Representing y in vector form,

$$y = \mathbf{x}^T \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \mathbf{x} + 2 \begin{pmatrix} \frac{1}{2} & 0 \end{pmatrix} \mathbf{x} + 1 \tag{2.0.2}$$

where,

$$\mathbf{x} = \begin{pmatrix} x \\ 0 \end{pmatrix} \tag{2.0.3}$$

Putting $y = 0$ we get,

$$x^2 + x + 1 = 0 \tag{2.0.4}$$

$$x^2 + 2\left(\frac{1}{2}\right)x + \frac{1}{4} + \frac{3}{4} = 0 \tag{2.0.5}$$

$$\left(x + \frac{1}{2}\right)^2 + \frac{3}{4} = 0 \tag{2.0.6}$$

Hence, for no value of x is the above equation 0. Therefore, the given equation has no real roots which is verified by the python plot.

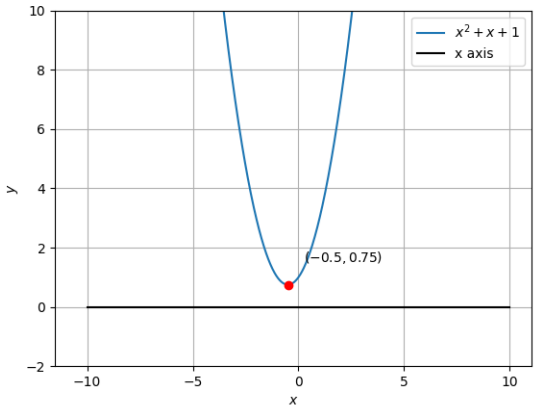

Fig. 0: Plot from Python Code.