

ASSIGNMENT-4

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Download all python codes from

<https://github.com/ThurpuNaveena/Assignment-4/blob/main/Assignment-4.py>

and latex-tikz codes from

<https://github.com/ThurpuNaveena/Assignment-4/blob/main/main.tex>

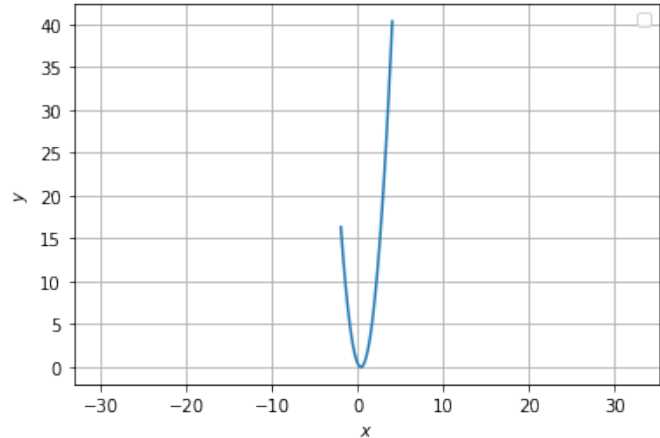


Fig. 2.1: Roots of $3x^2 - 2x + \frac{1}{3} = 0$

1 QUESTION No 2.25

Find the discriminant of the quadratic equation $3x^2 - 2x + \frac{1}{3} = 0$ hence find the nature of its roots.

2 SOLUTION

Given $3x^2 - 2x + \frac{1}{3} = 0$ can be expressed as

$$\mathbf{x}^T \begin{pmatrix} 3 & 0 \\ 0 & 0 \end{pmatrix} \mathbf{x} + \begin{pmatrix} -2 & -1 \end{pmatrix} \mathbf{x} + \frac{1}{3} = 0 \quad (2.0.1)$$

Compare given quadratic equation $3x^2 - 2x + \frac{1}{3} = 0$ with $ax^2 + bx + c = 0$, we get

$$a = 3, b = -2, c = \frac{1}{3} \quad (2.0.2)$$

$$\text{Discriminant}(D) = b^2 - 4ac \quad (2.0.3)$$

$$= (-2)^2 - 4(3)\left(\frac{1}{3}\right) \quad (2.0.4)$$

$$= 4 - 4 \quad (2.0.5)$$

$$= 0 \quad (\because D = 0) \quad (2.0.6)$$

Discriminant is zero and the nature of roots of equation $3x^2 - 2x + \frac{1}{3} = 0$ has two equal real roots.

$$\mathbf{x} = \frac{1}{3}, \frac{1}{3} \quad (2.0.7)$$