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

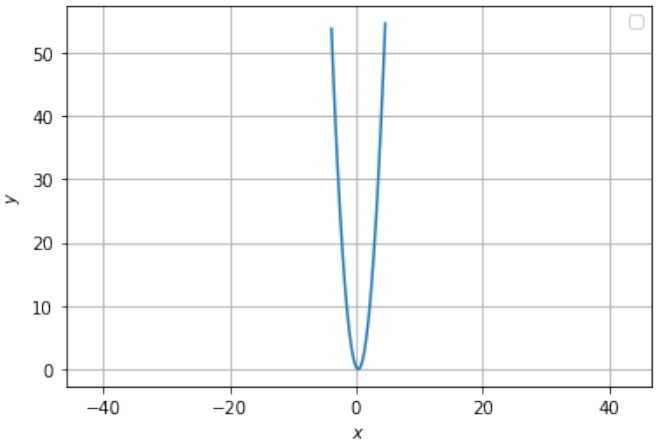

Fig. 2.1: Roots of $3x^2 - 2x + 1/3 = 0$

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

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

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

$$a = 3, b = -2, c = \frac{1}{3} \tag{2.0.2}$$

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

$$= (-2)^2 - 4(3)(\frac{1}{3}) \tag{2.0.4}$$

$$= 4 - 4 \tag{2.0.5}$$

$$= 0 \quad (\because D = 0) \tag{2.0.6}$$

Discriminant is zero and the nature of roots of equation $3x^2 - 2x + \frac{1}{3} = 0$ only one root. From the graph the quadratic equation will have intersect x-axis. If the discriminant is equal to zero,this means that the quadratic equation has two real,identical roots.