

Find the real root of the Equation: $f(x) = x^3 - 2x - 5 = 0$ by using bisection method/ Bolzano method in Five stage ?

Solution:

Let,

$$F(x) = x^3 - 2x - 5 = 0$$

Now,

$$\text{Put } x=0:- 0^3 - 2*0 - 5 = -5 \text{ (-ve)}$$

$$\text{Put } x=1:- 1^3 - 2*1 - 5 = -6 \text{ (-ve)}$$

$$\text{Put } x=2:- 2^3 - 2*2 - 5 = -1 \text{ (-ve)}$$

$$\text{Put } x=3:- 3^3 - 2*3 - 5 = 16 \text{ (+ve)}$$

Therefore the root lie between 2 and 3:

1st stage:-

Hence,

$$x_0 = 2 + \frac{3-2}{2} = \frac{5}{2}$$

$$x_0 = 2.5$$

now,

Find the real root of the Equation: $f(x) = x^3 - 2x - 5 = 0$ by using bisection method/ Bolzano method in Five stage ?

$$f(x_0) = 2.5^3 - 2 \cdot 2.5 - 5$$

$$f(x_0) = 5.625$$

So, the roots lie between 2 and x_0 (which is 2.5):

2nd stage:-

Hence,

$$x_1 = 2 + \frac{2.5 - 2}{2} = 2.25$$

$$x_1 = 2.25$$

now,

$$f(x_1) = 2.25^3 - 2 \cdot 2.25 - 5$$

$$f(x_1) = 1.89$$

So, the roots lie between 2 and x_1 (which is 2.25):

3rd stage:-

Hence,

$$x_2 = 2 + \frac{2.25 - 2}{2} = 2.125$$

Find the real root of the Equation: $f(x) = x^3 - 2x - 5 = 0$ by using bisection method/ Bolzano method in Five stage ?

$$x_2 = 2.125$$

now,

$$f(x_2) = 2.125^3 - 2 \cdot 2.125 - 5 =$$

$$f(x_2) = 0.346$$

So, the roots lie between 2 and x_2 (which is 2.125):

4th stage:-

Hence,

$$x_3 = 2 + 2.125/2 = 2.0625$$

$$x_3 = 2.0625$$

now,

$$f(x_3) = 2.0625^3 - 2 \cdot 2.0625 - 5 =$$

$$f(x_3) = -0.351$$

here, the roots lie between x_2 and x_3 :

5th stage:-

Find the real root of the Equation: $f(x) = x^3 - 2x - 5 = 0$ by using bisection method/ Bolzano method in Five stage ?

Hence,

$$x_4 = \frac{2.125 + 2.0625}{2}$$

$$x_4 = 2.093$$

now,

$$f(x_4) = 2.093^3 - 2 \cdot 2.093 - 5 =$$

$$f(x_4) = -0.017$$

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