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

## Solution:

Let,

$$
F(x)=x^{\wedge} 3-2 x-5=0
$$

Now,

Put $x=0:-0^{\wedge}(3)-2 * 0-5=-5(-v e)$

Put $x=1:-1^{\wedge}(3)-2 * 1-5=-6(-v e)$

Put $x=2:-2^{\wedge}(3)-2 * 2-5=-1(-v e)$

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

Therefore the root lie between 2 and 3 :
$1^{\text {st }}$ stage:-

Hence,

$$
\begin{aligned}
& x 0=2+3 / 2=5 / 2 \\
& x 0=2.5
\end{aligned}
$$

now,

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$f(x 0)=2.5^{\wedge}(3)-2 * 2.5-5$
$f(x 0)=5.625$

So, the roots lie between 2 and x 0 (which is 2.5 ):
$2^{\text {nd }}$ stage:-

Hence,

$$
\begin{aligned}
& x 1=2+2.5 / 2=4.5 / 2 \\
& x 1=2.25
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 1)=2.25^{\wedge}(3)-2 * 2.25-5 \\
& f(x 1)=1.89
\end{aligned}
$$

So, the roots lie between 2 and $x 1$ (which is 2.25 ):
$3^{\text {rd }}$ stage:-

Hence,

$$
x 2=2+2.25 / 2=4.25 / 2
$$

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$$
x 2=2.125
$$

now,
$f(x 2)=2.125^{\wedge}(3)-2 * 2.125-5=$
$f(x 2)=0.346$

So, the roots lie between 2 and $\times 2$ (which is 2.125 ):
$4^{\text {th }}$ stage:-

Hence,

$$
\begin{aligned}
& x 3=2+2.125 / 2=2.0625 \\
& x 3=2.0625
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 3)=2.0625^{\wedge}(3)-2 * 2.0625-5= \\
& f(x 3)=-0.351
\end{aligned}
$$

here, the roots lie between $x 2$ and $x 3$ :
$5^{\text {th }}$ stage:-

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Hence,

$$
\begin{aligned}
& x 4=2.125+2.0625 / 2 \\
& x 4=2.093
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 4)=2.093^{\wedge}(3)-2 * 2.093-5= \\
& f(x 4)=-0.017
\end{aligned}
$$

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1. Find the real root of the Equcation: $f(x)=x^{\wedge} 3-4 x-9=0$ by using bisection method/ Bolzano method upto 3 decimal places ?
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