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 ?

## Solution:

Let,

$$
F(x)=x^{\wedge} 3-4 x-9=0
$$

Now,

Put $x=0:-0^{\wedge}(3)-4 * 0-9=-9(-v e)$

Put $x=1:-1^{\wedge}(3)-4 * 1-9=-13$ (-ve)

Put $x=2:-2^{\wedge}(3)-4 * 2-9=-9(-v e)$

Put $x=3:-3^{\wedge}(3)-4 * 3-9=6(+v)$

Therefore the roots 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,

EasyExamNotes.com 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 ?

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 ?
$f(x 0)=2.5^{\wedge}(3)-4 * 2.5-9=0$
$f(x 0)=-3.375$

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

Hence,

$$
\begin{aligned}
& x 1=2.5+3 / 2= \\
& x 1=2.75
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 1)=2.75^{\wedge}(3)-4 * 2.75-9 \\
& f(x 1)=0.796
\end{aligned}
$$

So, the roots lie between $x 0$ and $x 1$ (which is 2.5 and 2.75 ):
$3^{\text {rd }}$ stage:-

Hence,

$$
x 2=2.5+2.75 / 2
$$

EasyExamNotes.com 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 ?

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 ?

$$
x 2=2.625
$$

now,
$f(x 2)=2.625^{\wedge}(3)-4 * 2.625-9=$
$f(x 2)=-1.412$

So, the roots lie between $x 1$ and $x 2$ (which is 2.75 and 2.625 ):
$4^{\text {th }}$ stage:-

Hence,

$$
\begin{aligned}
& x 3=2.75+2.625 / 2=2.6875 \\
& x 3=2.6875
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 3)=2.6875^{\wedge}(3)-4 * 2.6875-9= \\
& f(x 3)=-0.347
\end{aligned}
$$

here, the roots lie between $x 1$ and $x 3$ :
$5^{\text {th }}$ stage:-

EasyExamNotes.com 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 ?

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 ?

Hence,

$$
\begin{aligned}
& x 4=2.75+2.06875 / 2 \\
& x 4=2.718
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 4)=2.718^{\wedge}(3)-4 * 2.718-9= \\
& f(x 4)=0.207
\end{aligned}
$$

here, the roots lie between $x 1$ and $x 3$ :
$6^{\text {th }}$ stage:-

Hence,

$$
\begin{aligned}
& X 5=2.6875+2.718 / 2 \\
& X 5=2.702
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 5)=2.702^{\wedge}(3)-4 * 2.702-9= \\
& f(x 5)=-0.081
\end{aligned}
$$

EasyExamNotes.com 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 ?

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 ?
here, the roots lie between $x 4$ and $x 5$ :
$7^{\text {th }}$ stage:-

Hence,

$$
\begin{aligned}
& X 6=2.702+2.718 / 2 \\
& X 6=2.71
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 6)=2.71 \wedge(3)-4 * 2.71-9= \\
& f(x 6)=0.062
\end{aligned}
$$

here, the roots lie between $x 5$ and $x 6$ :
$8^{\text {th }}$ stage:-

Hence,

$$
\begin{aligned}
& X 7=2.702+2.71 / 2 \\
& x 7=2.706
\end{aligned}
$$

now,

EasyExamNotes.com 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 ?

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 ?

$$
\begin{aligned}
& f(x 7)=2.706^{\wedge}(3)-4 * 2.706-9= \\
& f(x 7)=-0.009
\end{aligned}
$$

here, the roots lie between $x 5$ and $x 7$ :
$9^{\text {th }}$ stage:-

Hence,

$$
\begin{aligned}
& X 8=2.702+2.706 / 2 \\
& X 8=2.706
\end{aligned}
$$

now,

$$
\begin{aligned}
& f(x 8)=2.706^{\wedge}(3)-4 * 2.706-9= \\
& f(x 8)=-0.009
\end{aligned}
$$

Hence, the roots lie between $x 8=2.706$ upto three decimal number.

Related posts:

1. 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?
2. By using Newton Raphson Method, $x^{\wedge} 4-x-10=0$ which is nearest to 2 , find real root correct to three decimal places? (R.G.P.V. 2022 NOV)

EasyExamNotes.com 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 ?

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 ?
3. Find a real root of the equation $\mathrm{x}=\mathrm{e}^{\wedge}(-\mathrm{x})$ using newton Raphson method.(R.G.P.V May 2019)

