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)

## Solution:

Let,

$$
F(x)=x^{\wedge} 4-x-10
$$

Newton Raphson Formula:
$X n+1=X n-f(X n) / f^{\prime}(X n)$

Here,
$f^{\prime}(X n)=4 x^{\wedge} 3-1$

According to the question, it will be given $x 0=2$..
$\mathrm{X} 0+1=\mathrm{x} 0-\left(\mathrm{x} 0^{\wedge}(4)-\mathrm{x} 0-10\right) /\left(4 \times 0^{\wedge}(3)-1\right)$
$\mathrm{X} 1=x 0-\left(x 0^{\wedge}(4)-x 0-10\right) /\left(4 \times 0^{\wedge} 3-1\right)$

Put the value of $x o=2$;
$X 1=2-\left(2^{\wedge}(4)-2-10\right) /\left(4^{*} 2^{\wedge}(3)-1\right)$
$X 1=2-(16-12) / 4 * 8-1$
$X 1=2-4 / 13$
$\mathrm{X} 1=1.871$

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Here $x 1=1.871$, and $n=1$
$X n+1=X n-\left(X n^{\wedge}(4)-X n-10\right) /\left(4 X n^{\wedge}(3)-1\right)$

Put the value of $n=1$
$\mathrm{X} 1+1=\mathrm{X} 1-(\mathrm{X} 1 \wedge(4)-\mathrm{X} 1-10) /\left(4 \mathrm{X} 1^{\wedge}(3)-1\right)$

Put the value of $x 1=1.871$
$X 2=1.871-\left(1.871^{\wedge}(4)-1.871-10\right) /(4 * 1.871 \wedge(3)-1)$
$X 2=1.856$

Here, $\mathrm{x} 2=1.856$, and $\mathrm{n}=2$
$X n+1=X n-\left(X n^{\wedge}(4)-X n-10\right) /\left(4 X n^{\wedge}(3)-1\right)$

Put $n=2$
$X 2+1=X 2-\left(X 2^{\wedge}(4)-X 2-10\right) /(4 X 2 \wedge(3)-1)$

Put the value of $x 2=1.856$
$X 3=1.856-\left(1.856^{\wedge}(4)-1.856-10\right) /\left(4^{*} 1.856^{\wedge}(3)-1\right)$
$X 3=1.856$

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)

Since, $x 2=x 3$, so the real root correct to three decimal place is 1.856 .

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