

## Question #65681, Math / Other

Find an appropriate root of  $x^3 + 2x^2 - 5 = 0$  in  $[1, 2]$  with  $10^{-5}$  accuracy by

i) Newton Raphson Method

ii) Secant Method

What conclusions can you draw from here about the two methods?

**Answer.**

$$i) x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} = x_n - \frac{x_n^3 + 2x_n^2 - 5}{3x_n^2 + 4x_n}$$

$n$	$x_n$	$x_{n+1}$
1	1	1.285714
2	1.285714	1.243001
3	1.243001	1.241897
4	1.241897	1.241897

So, with  $10^{-5}$  accuracy  $x = 1.24190$ .

$$ii) x_{n+2} = x_{n+1} - \frac{f(x_{n+1})(x_{n+1} - x_n)}{f(x_{n+1}) - f(x_n)}$$

$n$	$x_n$	$x_{n+2}$
1	1	1.153846
2	2	1.211286
3	1.153846	1.24359
4	1.211286	1.241865
5	1.24359	1.241897
6	1.241865	1.241897
7	1.241897	1.241897

So, with  $10^{-5}$  accuracy  $x = 1.24190$ .

The Newton-Raphson Method converges better.

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