

I. Determine if the statement is true or false, and justify your answer

a) The Newton method is guaranteed to quadratically converge to root $p=3$ for $f(x) = x^3 - 6x^2 + 9x$. ()

b) The Bisection method needs 10 iterations to compute a root of $f(x)=\sin(x)-2x$ for $0 \leq x \leq 1$ with 10^{-3} accuracy. ()

c) if $a_n = a + O(n^{-p})$ and $0 < q < p$ then $a_n = a + O(n^{-q})$. ()

II.1) Show that the Newton method applied to $x^m = R$ to determine $\sqrt[m]{R}$ for $2 = m$, $R > 0$ results in an iteration formula

$$x_{n+1} = \frac{(m-1)x_n^m + R}{mx_n^{m-1}}$$

2) Approximate the root of 5 for $m=3$ to 3 significant figures using this iterative formula starting at $x_0=1$, compute the **exact error**.

IV.

- 1) Use the **secant method** to approximate $(5)^{1/2}$ in **[2, 3]**
- 2) Use the **bisection method** to find the initial starting points.
- 3) Show only three iterations and find the **relative error** .