Name : ___

TO RECEIVE FULL CREDIT YOU MUST SHOW ALL YOUR WORK (Unless otherwise stated).

- 1. State the order of convergence of the methods listed below when used to determine the zeros of a given nonlinear function f(x).
 - the Bisection method
 - the Newton-Raphson method
 - the Secant method
- 2. How many steps of the bisection method are needed to determine the root with an error of at most $\frac{1}{2} \times 10^{-12}$, if the starting interval is [0.2, 1.8]?

- 3. Every polynomial of degree n has n zeros (counting multiplicity) in the complex plane.
 - Does every real polynomial have n real zeros?
 - Does every polynomial of infinite degree $f(x) = \sum_{n=0}^{\infty} a_n x^n$ have infinitely many zeros?

4. Compute the zero of $f(x) = x^3 - 3x + 1$ on [0, 1] using the Bisection method. Carry out just three steps.

5. If Newton's method is used on $f(x) = x^3 - x + 1$ starting with $x_0 = -2$, what will x_3 be?

6. If we use the secant method on $f(x) = x^3 - 2x + 2$ starting with $x_0 = 0$ and $x_1 = 1$, what is x_3 ?