

Homework 2: CS321-003, Spring 2007

Due Date: 1:50pm, February 16, 2007

Please show all steps in your work. Please be reminded that you should do your homework independently.

1. (20 points) Using the bisection method, determine the point of intersection of the curves given by $y = x^3 - 2x + 1$ and $y = x^2$. Let r be the x coordinate of the intersection point, estimate how many steps of the bisection method are needed so that $|x_n - r| \leq 10^{-3}$? For the computation, you need to have a table, with n , x_n , $f(x_n)$, and errors listed.
2. (20 points) Find the two positive zeros of $x^4 + 2x^3 - 7x^2 + 3$ using Newton's method, correct to two significant figures. You need to show detailed computational steps and write a code to implement your algorithm. Just giving solutions without any details will receive zero point for this problem.
3. (10 points) The formula for the secant method can also be written as

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

Establish this formula and explain why it is inferior to the formula

$$x_{n+1} = x_n - \left(\frac{x_n - x_{n-1}}{f(x_n) - f(x_{n-1})} \right) f(x_n)$$

in a computer program.