

Homework 1

CS 323 - Numerical Analysis

1. Find the real root of $x^2 = 0.7$ using 3 iterations of the bisection method with $a = 0.5$, $b = 2$.
2. Find **all** real roots of $f(x) = -2 + 6x - 4x^2 + 0.5x^3$ using Newton's Method with $\epsilon = 0.01$.
3. The sum of 2 numbers is 20. If we add to each number its square root, the product of both sums is 155.55. Find the two numbers with $\epsilon = 10^{-4}$.
4. The following equation is used to compute monthly payments on a mortgage:

$$A = \frac{P}{i} (1 - (1 + i)^{-n})$$

Where A is the total mortgage amount, P is the monthly payment, i is the monthly interest rate, and n is the number of months.

Suppose that a client wants an \$800,000.00 mortgage to be paid in 30 years but he can pay no more than \$7,000.00 each month. What is the highest monthly interest rate that he would be able to pay?

5. Enumerate all the elements in $f_l(2, 2, -1, 1)$
6. Use the bisection method to find a root of $x^3 - 7x^2 + 14x - 6 = 0$ in $[1, 3.2]$ with $\epsilon = 10^{-2}$
7. If $P(x) = 10x^3 - 8.3x^2 + 2.295x - 0.21141 = 0$
 - (a) Find a root using the bisection method with $a = 0.25$, $b = 0.3$ and $\epsilon = 10^{-3}$
 - (b) Now use Newton's Method to find a root using $x_0 = 0.28$. Explain.
8. Find an accurate value of

$$f(x) = \sqrt{1 + \frac{1}{x}} - 1$$

for large values of x . Compute

$$\lim_{x \rightarrow \infty} x f(x)$$