CS 3320

Homework – Chapter 6

Roots of Equations – Open Methods

1. Use simple, fixed-point iteration to find a zero of the equation $x - \cos x = 0$. Use a calculator. Make sure your calculator is in *radian* mode, not degree mode. Describe the steps you used to find the root. Explain why your procedure converged to a solution. (10 pts.)

2. Use Newton's method to solve the following:

    a. Form an equation whose root will yield the *square root* of the number a. Write the iteration formula to solve this equation using Newton's method. Use the formula with a calculator or a Python program to find the square root of 3. Report how many iterations the process took. (10 pts.)

    b. Repeat the previous part to find the *cube root* of 3. (10 pts.)

3. When solving the equation $x^2 - 3x + 2 = 0$ by simple, fixed-point iteration, you can rearrange the evaluation as x = g(x) in different ways. First, solve for x = g(x) by isolating the middle term. Second, solve for x = g(x) by adding x to both sides of the original equation. For each case:

    a. In what interval can you choose an initial guess for the iteration that will guarantee that the iteration will converge to a root? (10 pts.)

    b. What is the order of convergence near the root where your formula converges in each case? (10 pts.)

4. Problem 6.4 parts (a) and (d) (10 pts.)