Assignment: Module 6 Name: Hoyoung kim

Disclaimer: This is my work, not that of others

Total Score: 55

1. 10
2. 10
3. 10
4. 10
5. 10
6. 5

1. Use simple, fixed-point iteration to find a zero of the equation x-cosx = 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.)

x- cosx = 0 is cosx = x which x will always between 1, -1 so choosing a random value and repeating cos, we will get the root value

cos(6) = 0.9601702866503661
cos(0.9601702866503661) = 0.5733804803696215
cos(0.5733804803696215) = 0.8400719526199
cos(0.8400719526199) = 0.6674092450901945
cos(0.6674092450901945) = 0.7854278560675948
cos(0.7854278560675948) = 0.7070857849864265
cos(0.7070857849864265) = 0.7602582368152349
cos(0.7602582368152349) = 0.7246580816946515
cos(0.7246580816946515) = 0.7487261163556866
cos(0.7487261163556866) = 0.7325566034219113

starting at 6 when recursed 10 times the root nears to 0.7325566034219113

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.)

When x being Sqrt(3) to =0, the f(x) needs to be x^2 – a where a is 3. If f(x) = x^2 -a then f'(x) is 2x. so with that when used with x1 = x – f(x)/f'(x) => x1 = x – (x^2 – a)/(2x) where a is 3.

When x is 2,
1.75
1.7321428571428572
1.7320508100147276
1.7320508075688772

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

When x being Sqrt(3) to =0, the f(x) needs to be x^2 – a where a is 3. If f(x) = x^2 -a then f'(x) is 3x^2. so with that when used with x1 = x – f(x)/f'(x) => x1 = x – (x^3 – a)/(3x^2) where a is 3.

When x is 2,
1.75
1.7321428571428572
1.7320508100147276
1.7320508075688772

3. When solving the equation x^2-3x+2 =0 by simple, fixed-point iteration, you

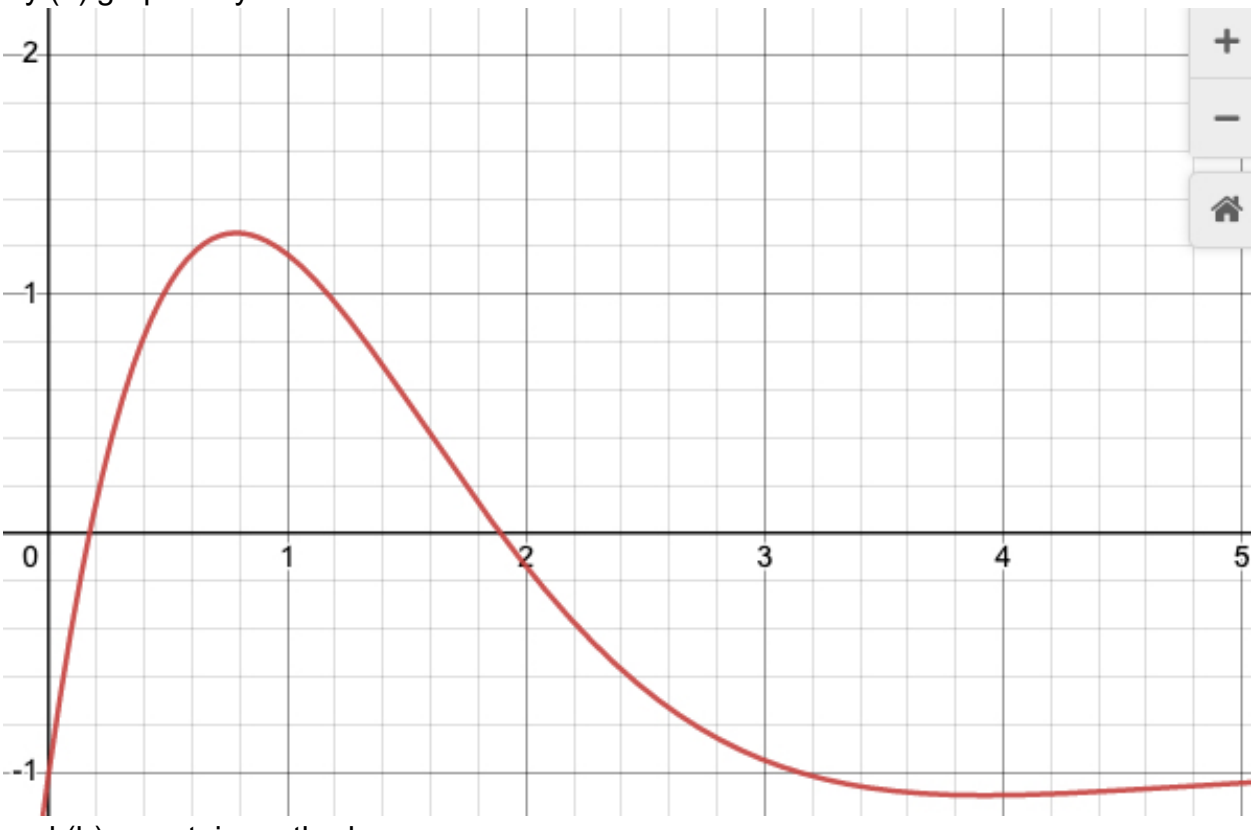
can rearrange the evaluation as x = g(x) in different ways. First, solve for x = g(x) by isolating the middle term. Second, solve for x = g(x) by adding x to both sides of the original equation. For each case:

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.)

To isolate the middle term, (x^2+2)/3 = x where f'(x) is (2/3)x. this will be less then 1 and -1 when 3/2, and -3/2
For x^2-2x+2 = x become f'(x), then this would be 2x-2 where, for this to be between 1 and -1, x would be ½ and 3/2

b. What is the order of convergence near root where your formula converges in each case? (10 pts.)
if x we pick x to be 1, and 2 root convergence would happen with (2/3)x as 2/3 and 4/3 and fore 2x-2, it would be 0 and 2

4. Problem 6.4 parts (a) and (d) (10 pts.)
Determine the smallest positive root of f(x) = 7sin(x)(e^-x)-1
By (a) graphically



and (b) wegstein method