Jeremy Cross
200319523

ENSE 350 Lab Report 3

Problem 1 Newton-Raphson Method

The newton-raphson method works by first taking a x value. The algorithm sets the x value equal to an initial guess of the root xi and uses the equation $x_{i+1} = x_i - f(x_i)/f'(x_i)$ to estimate the value of the new root. The approximate error is then calculated for the current iteration. The algorithm iterates in a while loop until the approximate error is less than 0.01.

Problem 2 a) Bisection Method

The bisection method works by first taking an upper and lower point. At least one root exists between the two points if the function is real, continuous, and changes sign. If $f(x_l)*f(x_u) < 0$ then the root lies between xl and xm. If $f(x_l)*f(x_u) > 0$ then the root lies between xm and xu. If $f(x_l)*f(x_u) = 0$ then the root is xm. The algorithm works by first taking the xl and xu values and finds the midpoint. The approximate error is then calculated for that iteration. The midpoint is then checked to see if it is the root. If so, the root is found and the algorithm is done. If not then then an if statement determines with which points the next iteration will check between. This algorithm is run within a while loop where it will iterate until the approximate error is less than 0.01.

Problem 2 b) Secant Method

The secant method works by first taking two x values. The algorithm works by first estimating the root using the formula $x_{i+1} = x_i - (f(x_i)*(x_i-x_{i-1}))/(f(x_i)-f(x_{i-1}))$. The approximate error is then calculated for the current iteration. Lastly the x values are updated so that the x1 value equals x2 and x2 equals the new calculated x_{i+1} value. The algorithm iterates in a loop until the approximate error is less than 0.01.