Assignment 4

1. Implement the bisection method to calculate an approximation to the zero of a continuous function f given that $f(a) < 0$ and $f(b) > 0$. Ensure that there is a root at most ϵ away from the approximation. Calculate in advance, the number of steps required.

2. Apply your program to find e using $\log(e) = 1$ accurate upto 2^{-53}. Use the built-in log function as well as your own program to calculate the log function.

3. Implement the linear interpolation method to calculate an approximation to the zero of a continuous function f given that $f(a < 0$ and $f(b) > 0$. Ensure that there is a root at most ϵ away from the approximation. Estimate in advance, the number of steps required.

4. Apply your program to find π using $\sin(\pi) = 1$ accurate upto 2^{-53}. Use the built-in sin function as well as your own program to calculate the sin function.

5. Implement the Newton-Raphson method to calculate an approximation to the zero of a continuously differentiable function f given that a is *close* to a zero of f. Can you estimate in advance, the number of steps required to ensure that there is a root at most ϵ away from the approximation?

6. Apply your program to find $2^{1/3}$ accurate upto 2^{-53}.