All the source codes are uploaded to my git repository. Python 2.7 is used for this assignment.

**Test function**

The test we used is the function type one from the fortran code which is as follows: $f(x) = x + \exp(x) + \frac{10}{1+x^2} - 5$

This function is plotted using matplotlib in “function.py” file, which is uploaded to my repository as well. As you can see in Figure 1, which shows our test function, the root is greater that -1 but close to it.

$$f(x) = x + \exp(x) + \frac{10}{1+x^2} - 5$$

![Figure 1: Test function](image)
Different initial guesses

We tried three different initial guesses. One that is close to the true solution (-0.5), another one which is farther away (2), and finally one which is even farther (-12).

As you can see in Figures 2, 3, and 4, if we start close to true solution, we will get to the solution with a few iterations and the solutions we find in each iteration get closer and they will not deviate much from the true solution. But, as we start from an initial guess which is farther from the true solution (such as initial guess equal to two), the number of iterations increase and we might deviate more from the true solution along the way, and the error might increase in some iterations. As we get farther (such as initial guess equal to -12), we see that the number of iterations increases more and the error increases in many steps. In all the cases of different initial guesses, the convergence pattern for the three different thresholds that we tried are similar. But in some cases for the smaller thresholds, it takes more iterations to get to the solution which holds for that threshold.

**Initial guess: -0.5**

As we can see in Figure 2, the convergence for all the different values of threshold look very similar since all of them have converged to the real value.

**Initial guess: 2**

As we can see in Figure 3, the convergence for all the different values of threshold look similar, but for the $1e-6$ and $1e-8$ we have one more iteration since they need to be more accurate (need to be closer to the true solution).

**Initial guess: -12**

As we can see in Figure 4, the convergence for all the different values of threshold look similar, but for the $1e-6$ and $1e-8$ we have more iterations since they need to be more accurate (need to be closer to the true solution).

**Report and website**

The report is written in LATEX and the "hw6.tex" and the "hw6.pdf" files are uploaded to my repository. Also all the files needed to compile the report is included in "hw6_report.zip" which is also uploaded to the repository.

You can access Homework 6 files at [https://people.ucsc.edu/~npashana/homework_6.html](https://people.ucsc.edu/~npashana/homework_6.html).
Figure 2: Initial guess: -0.5
(a) Initial guess: 2  
(b) Initial guess: 2  
(c) Initial guess: 2

Figure 3: Initial guess: 2
Figure 4: Initial guess: -12