Exercise 1

$f(x) = 10x^3 - 8.3x^2 + 2.295x - 0.21141 = 0$ has a root at $x = 0.29$.

a) Create a *BisectionMethod.cpp*. Use bisection method with initial interval $a = 0.28516, b = 0.400912$ to find this root. Print the value of approximation $x_i, i = 0, 1, 2, ..., n_B$ on screen at each interaction.

Note: The absolute approximation error $|x_i - x|(x = 0.29)$ for final approximation x_{n_B} is no greater than 0.00001.

b) Create a *NewtonsMethod.cpp*. Use Newton's method with initial approximation $x_0 = 0.343036$ to attempt to find this root. Print the value of approximation $x_i, i = 0, 1, 2, ..., n_N$ on screen at each interaction.

Note: The absolute approximation error $|x_i - x|(x = 0.29)$ for final approximation x_{n_N} is no greater than 0.00001.

c) Create a line plot for question a) and b). Data in X represents interactions $i = 0, 1, 2, ..., n_{B,N}$ and data in Y represents approximation error $|x_i - x|(x = 0.29)$. You can use any tools you prefer to draw this figure. Compare the different between bisection method and Newton's method. Post your answers and the figure in a *word* or *pdf* file named *Assignment3-c*.

Examples:

· Fig.1 is an example for outputs of bisection method with initial interval $a = 0.28878, b = 0.29240$.

```
x0: 0.29059
x1: 0.289685
x2: 0.290137
x3: 0.289911
x4: 0.290024
x5: 0.289968
x6: 0.289996
x7: 0.29001
x8: 0.290003
```

Figure 1: Outputs in Question a)

· Fig.2 is an example for question c). Use bisection method with initial interval $a = 0.28878, b = 0.29240,$. Use Newton's method with initial approximation $x_0 = 0.29059$.

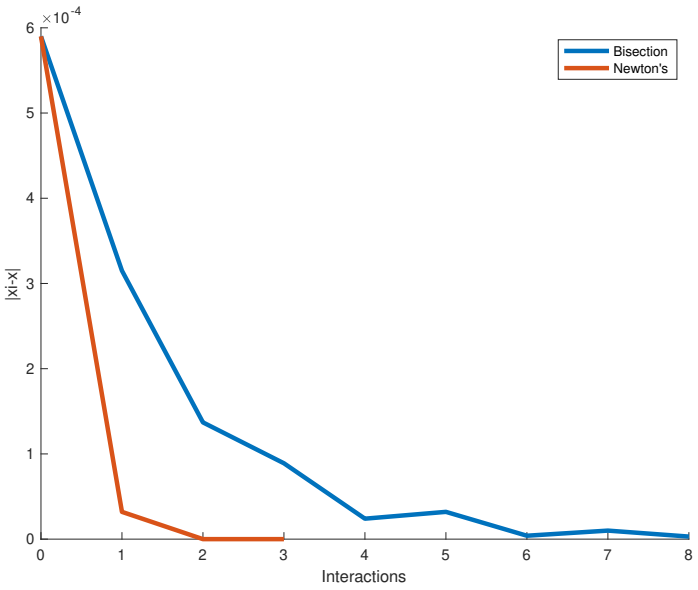

Figure 2: Example for Question c)

· Fig.3 is an example for an assignment submission.

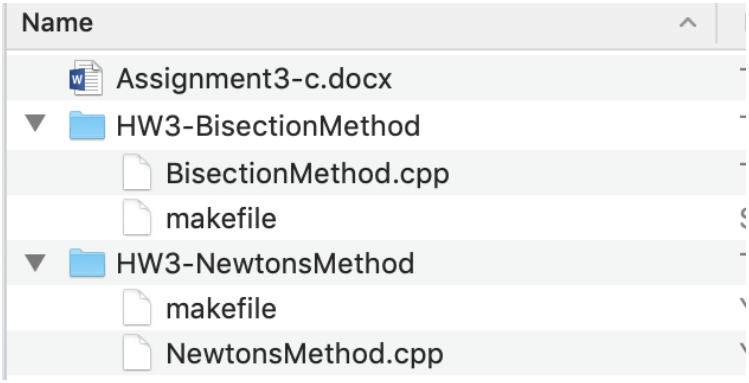

Figure 3: Assignment Submission