Homework 2

Question 1 (easy)

Find the roots of $f(x) = 2x^2 + 6x + 4$ in the interval $[-3, -1.5]$ using the

1. Bisection Method

2. Fixed-Point Method (find a proper $g(x)$)

3. Newton's Method (use initial guess of -3)

with tolerance of 10^{-5}. Write your code and the final answer. Also, report how many iterations did each algorithm take to reach the final answer.

Question 2 (easy)

In Session 2, we solved the equation $e^x - 5x + 2 = 0$ by defining $g(x) = ln(5x - 2)$ and solving the equation $g(x) = x$ using the Fixed Point method in the interval $[2, 3]$. Now, try a different $g(x)$ and write the steps you followed to check if it meets the algorithm's conditions, write your code, and write the found answer.

Question 3 (easy)

Find the roots of $f(x) = e^x - 5x + 2$ in the interval $[2, 3]$ using

1. Bisection Method

2. Newton's Method, but use the initial guess of 1. What happens? Why?

Question 4 (medium)

Solve the the Fibonacci equation (12th century) $x^3 + 2x^2 + 10x - 20 = 0$. Compute one solution using any of the 3 methods. Write your code and the final answer.