BLG202E Numerical Methods in Comp. Eng.

Spring 2023 - Homework I

Due: March 20, 2023

By turning in this assignment, I agree by the ITU honor code and declare that all of this is my own work.

Important Notes

- You are required to submit a PDF document and Python source codes to Ninova before the deadline.
- Solve the questions by hand with necessary explanations of your steps. You may write your answers to a paper by hand, scan the papers and transform the scans to a PDF document. In that case, please make sure that the scans are readable.
- For questions 2 and 4, write necessary `Python` programs and add the screenshots of the execution results to the document. Make sure that the output of the programs are appropriately structured. Submit the `Python` codes for questions 2 and 4 as well.
- Please make sure that you write your full name and student identification number to every file you submit.
- If you have any questions, please contact Res. Asst. Rumeysa Aslıhan Ertürk via rumeysa.erturk@itu.edu.tr.
- Remember, there are only 10 types of people in the world – those who understand binary, and those who don't.

Question 1

How do you write 1621 and 443/2048 in binary ? (Do not use a computer).

Question 2

Construct a program whose input is a rational number and output is the corresponding binary. Implement the method that we saw in the class. Give some examples to show that your program works as expected.

Question 3

Approximate $17^{\frac{1}{3}}$ via either Taylor Expansion or Bisection Method. Present the error in your computation.

Question 4

Construct a program implementing the bisection method so that its inputs are a, ϵ and output is x such that $|a^{\frac{1}{5}} - x| \leq \epsilon$. Show that the implementation works by giving two examples.