HW 1 – 4640, Spring 2020
Instructor: Wenjing Liao

• HW 1 is due on Wednesday January 22 at the beginning of the class.
• You are strongly encouraged to type out your solutions using latex.
• Please write your solutions independently, and include your printed code.

1: Atkinson (2nd Edition): Chapter One – Problem 21
2: Atkinson (2nd Edition): Chapter One – Problem 10 (a,b,c,d)
3: Atkinson (2nd Edition): Chapter One – Problem 11 (b)
4: Atkinson (2nd Edition): Chapter One – Problem 12 (b,f)

5: Design algorithms to achieve the following tasks:
   (1) Convert a binary number into decimal.
   (2) Convert a decimal $x \in [0, 1)$ into binary.

In each part, you need to give the algorithm, and write the computer code (in any language) to implement the algorithm. Your answer must contain at least 5 examples to illustrate the results of your code. You need to submit a written part, including the algorithm and the examples, as well as the code. The code can be printed out and then submitted.

6: Implement the algorithm Newton to find the roots of
   (1) $e^x - 3x^2 = 0$
   (2) $x = 1 + 0.3 \cos x$

What is the rate of convergence? Your must demonstrate how you draw the conclusion.

7: Use the bisection algorithm to find the smallest positive zero of the polynomial $p(x) = 2x^3 - 3x - 4$. What is the rate of convergence? Your must demonstrate how you draw the conclusion.