CS 3513: Numerical Methods for Digital Computers  Spring 2020
Homework 1: Errors
Due Date: February 5 (Wednesday), 2020

Notes:

- Read Course Information: Section 6 (Miscellaneous) and Section 8 (Academic Dishonesty or Misconduct).
- When you are giving a construction, example, etc., provide a justification with your argument. Your solutions to numerical problems must contain the derivation of your answers. In all of your presentations, strive for correctness, completeness, and clarity. When in doubt about the assumptions of problems, the interpretations of wording, etc., consult the instructor.
- You should strive to complete all problems assigned, and a subset of them will be graded.

1. Read the notes above carefully.

2. Do [Cha10] Prependix B, Section B.2, exercise 4. Show all your work.

3. Assume that $n$ and $b$ are positive integers. Develop and prove a necessary and sufficient condition for the base-$b$ representation of $n$ having a leading 1 (at highest-order position).
   Simplify the above condition, if possible, and write a pseudo-code function that decides if a positive integer $n$ begins with 1 in its base-$b$ representation.

4. Do [Cha10] Chapter 1, Section 1.2, exercises 1 and 3.

5. Do [Cha10] Chapter 1, Section 1.2, Problem 1. Provide a detailed derivation/proof of your formula.

6. Do [Cha10] Chapter 1, Section 1.3, exercises 2, 3, 4, 5, 6(c), 7(b), and 9.

7. Do [Cha10] Chapter 1, Section 1.4, exercises 1, 4, and 5(a):part (1) and 5(b):part (1).