COMP 4200 - Formal Languages: Homework #1

Due on Thursday, January 25, 2024, at 10:00 pm
Instructor: Hugh Kwon

Instructions:

- Submit your work as a single PDF through GradeScope (link on Canvas). You will need to match your solution to each question (click for the instruction). Failure to match your solution to the appropriate question will result in a grade of 0 for each unmatched question.
- Note that it is your responsibility to make your submissions readable by TAs. If your handwriting is not readable by the TA, he may not give you full credits (or any credits at all) for the illegible part.
- You will not only be graded on your mathematics, but also on your organization, proper use of English, spelling, punctuation, and logic.
- Late submissions will NOT be graded unless as specified by the Late Assignment Submission policy in the syllabus.
- For any questions regarding the assignment or grading of the assignment, please email our TAs.

Problem 1

Total: 20 points (5 points each)
Answer the following exercises/problems in the book:

1. Exercise **0.1f** (page 25)
2. Exercise **0.1e** (page 25)
3. Exercise **0.6d** (page 26)
4. Exercise **0.6e** (page 26)

Problem 2

Total: 40 points (20 points each)
Prove the following by mathematical induction. For each solution, please specify your (1) base case; (2) induction hypothesis; and (3) inductive step.

1. For all $n \in \mathbb{N}$:
$$5^n + 5 < 5^{n+1}$$
2. For all $n \in \mathbb{N}$:
$$\sum_{i=1}^{n} (-1)^i i^2 = (-1)^n \frac{n(n+1)}{2}$$