COMP 4200 - Formal Languages: Homework #1

Due on Friday, Jan 22, 2021 at 8:00am

Instructor: Dr. Anh Nguyen

Note: Late assignments may not be graded (see the policy in syllabus). You should submit your work on a separate sheet of paper in the order the questions are asked. You will not only be graded on your mathematics, but also on your organization, proper use of English, spelling, punctuation, and logic.
Submission: Please upload your submission as **one single pdf file** and upload it to Canvas.

Problem 1

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

1. For all $n \in \mathbb{Z}^+$:
$$\sum_{i=1}^{n} \frac{1}{i(i+1)} = \frac{n}{n+1}$$
2. For all $n \in \mathbb{Z}^+$:
$$1^3 + 2^3 + 3^3 + ... + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$