4200 - Formal Languages: Homework #2

Due on Friday, Feb 5, 2021 at 8:00am

Instructor: Dr. Anh Nguyen

Note: Late assignments will not be graded. You will not only be graded on your mathematics, but also on your organization, proper use of English, spelling, punctuation, and logic.
There are in total 2 problems in this homework.

Problem 1

15 points
Draw the state diagram of DFAs recognizing the following languages. Alphabet $\Sigma = \{0, 1\}$.

a. A = $\{w|w$ starts with 0 and has odd length, or starts with 1 and has even length$\}$

b. B = $\{w|w$ is any string except 11 and 111$\}$

c. C = $\{\epsilon, 0\}$

Problem 2

10 points
Example of set difference: $A = \{0, 01\}$, and $B = \{0, 11\}$. Then, $A - B = \{01\}$.

Prove that regular languages are closed under the set *difference* operation. That is, if A and B are regular languages, then, $A - B$ is also a regular language.

Hint: One can prove the statement above by either (1) contradiction or (2) construction. For the proof, you may make use of the theorems that regular languages are closed under *union*, *intersection*, and *complement* (already discussed in class).