

CSCE 222 [503] Discrete Structures for Computing
Spring 2015 – Philip C. Ritchey

Problem Set 11

Due dates: Electronic submission of the PDF file for this homework is due on **4/23/2015 (Thursday) before 11:59 p.m.** on <http://ecampus.tamu.edu>. A signed and stapled paper copy of the PDF is due on **4/24/2015 (Friday)** at the beginning of class.
You must show your work. **No work → no credit.**

Name: YOUR NAME

Resources. Discrete Mathematics and Its Applications by Rosen, ADDITIONAL PEOPLE, BOOKS, ARTICLES, WEB PAGES, ETC. THAT HAVE BEEN CONSULTED WHEN PRODUCING THIS HOMEWORK. FAILURE TO CITE SOURCES WILL RESULTS IN FAILURE TO PASS THIS CLASS.

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

Signature: _____

Problem 1. (15 points) Construct a DFA that accepts all strings over $\Sigma = \{0, 1\}$ that do not contain three consecutive 0s.

Problem 2. (15 points) Give a Regular Expression for the language in Problem 1.

Problem 3. (15 points) Construct a NFA that accepts the language specified by the Regular Expression $((ab \cup a)^*(ab^*))$.

Problem 4. (15 points) Give a Regular Expression for the language $L = \{w \mid w \in \{0, 1\}^* \text{ contains an odd number of 0s}\}$.

Problem 5. (15 points) Let L_1, L_2 be regular languages:

$$L_1 = \{w \mid w \in \{a, b\}^* \text{ begins with } a\}$$

$$L_2 = \{w \mid w \in \{a, b\}^* \text{ ends with } a\}$$

- Find R_1, R_2 , regular expressions that specify L_1 and L_2 , respectively.
- Construct A_1 and A_2 , finite automata (DFA or NFA) that accept L_1 and L_2 , respectively.
- Use A_1 and A_2 to construct A , an automaton that accepts the language $L_1 - L_2$.
- Convert A to a regular expression.

Problem 6. (15 points) Construct a finite automaton (DFA or NFA) that recognizes floating point numbers. Strings that should be accepted include: $\{0, 3.14, 0.50, -6\}$. Strings that should not be accepted include: $\{-0, .4, 14., 034\}$. Convert your automaton into a Regular Expression.

Problem 7. (15 points) Suppose L is a regular language. Show that $L^R = \{w^R \mid w \in L\}$ is also regular, where w^R is the reversal of w .

Checklist:

- Did you add your **name**?
- Did you disclose all **resources** that you have used?
(This includes all people, books, websites, etc. that you have consulted)
- Did you **sign** that you followed the Aggie honor code?
- Did you solve **every problem**?
- Did you submit the PDF file of your homework on **eCampus**?
- Did you submit a **signed and stapled** hardcopy of the PDF file **in class**?