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 **5/3/2015 (Sunday) before 11:59 p.m.** on `http://ecampus.tamu.edu`. A signed and stapled paper copy of the PDF is due on **5/4/2015 (Monday)** 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)
Consider the following grammar
$S \to bS \mid aaA$
$A \to aA \mid a$

a. Show that *bbbaaa* belongs to $L(G)$.

b. Show that *bbaab* does not belong to $L(G)$.

c. Describe $L(G)$. (use English or a regular expression)

Problem 2. (15 points)
Give a regular grammar for the set of strings that neither contains 2 consecutive 0s nor 2 consecutive 1s.

Problem 3. (15 points)
Give a context-free grammar for $L = \{a^n b^k c^k \mid n, k > 0\}$.

Problem 4. (15 points)
Give a context-free grammar for $L = \{ww^R \mid w \in \{0,1\}^*\}$.

Problem 5. (15 points)
Show that this grammar is ambiguous: $S \to aSb \mid abS \mid \epsilon$

Problem 6. (15 points)
Construct a pushdown automaton that recognizes $L = \{a^m b^{2m} | m \geq 0\}$.

Problem 7. (15 points)
Give a context-free grammar for regular expressions with $\Sigma = \{0, 1\}$ and use it to derive the expression $((1 \cup ((01) \cup (0(01))))^*(\epsilon \cup (0 \cup (00))))$.

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**?