CSE273 Introduction to Theory of Computation
Homework5
Post: March 23, 2017
Due: March 28, 2017

Submit by 1:00 pm on Tuesday. Complete all the questions in the below using pen and paper. Then scan your writings, make pdf, and insert the pdf file on Piazza under hw5 folder. Don't forget to make your post private; so that it would be visible only to the instructor. Be alert about cheating. Don't try to use other's work. Your handwritings will be verified. Once if you are caught for cheating, it will be all over of CSE 273 for you. You won't be allowed to continue this course anymore.

***For any kind of problem while working on the homework, write in the Q&A section of Piazza or post on FB group.

Problem 1.

Convert the following context-free grammar to Chomsky normal form showing the steps taken to reach the final result.

S -> A

A -> a A b | B

B -> c B | ε

Problem 2.

Put the following grammar into Chomsky Normal Form:

S -> AB | B

A -> aAS | aA | a

B -> SbS | bS| b| aAS | aA | a| bb

Problem 3.

Convert the following CFG into Chomsky Normal Form:

S → AbA

A → Aa|ε

Problem 4.

Why do we need Chomsky Normal Form for the CFGs?

Problem 5.

What are the differences between PDA and FA?

Problem 6.

Construct a PDA for the language $L = \{0^n1^n : n>0\}$

Problem 7.

Construct a PDA for balanced parentheses.

Problem 8.

A pushdown automaton A is specified by

A = ({q0,q1},{a,b},{Z,X},δ,qin,Z,∅), where δ contains the following transitions:

(q0,a,Z) → (q0,λ), (q0,a,Z) → (q0,XZin), (q0,a,X) → (q0,XX), (q0,b,X) → (q1,λ), (q1,b,X) → (q1,λ), (q1,a,Z) → (q0,Z).

Determine a (reduced) context-free grammar G.

Problem 9.

Investigate the notion of 'recursive finita state automata'. How do you formalize this notion? How do you define determinism here? What is the relation to (deterministic) pushdown automata?