HW 8 – Regular Expression

CS 421 – Spring 2014
Revision 1.0

Assigned Mar 20, 2014
Due Apr 6, 2014, 11:59pm

1 Change Log

1.0 Initial Release.

2 Turn-In Procedure

This assignment is named `hw8`. Using your favorite tool(s), you should put your solution in a file named `hw8-solution.pdf`. Your answers to the following questions are to be submitted using the svn repository as described in the section `Instruction for Solving and Submitting Assignments` on the web-page: `http://courses.engr.illinois.edu/cs421/sp2014/mps/index.html`

3 Objectives and Background

The purpose of this HW is to test your understanding of regular expressions and distinguish between regular grammars and other grammars.

4 Problems

1. (20 points) Decide whether the following (informally described) languages are regular. For each regular language, write a **regular expression** and a **regular grammar** of the language. For each language that is not regular, make an argument of why the language is not regular.

    1. $L_1 = \{w | w$ starts with symbol 0 and contains the symbol 1 at least once$\}$ where $\Sigma = \{0, 1\}$
    2. $L_2 = \{w | w$ contains an equal number of 0s and 1s$\}$ where $\Sigma = \{0, 1\}$
    3. $L_3 = \{w |$the length of w is odd$\}$ where $\Sigma = \{a, b\}$
    4. $L_4 = \{w | w$ does *not* contain symbol a immediately followed by symbol $b\}$ where $\Sigma = \{a, b, c\}$
    5. $L_5 = \{w |$the length of w is a perfect cube$\}$ where $\Sigma = \{a, b, c\}$