CS 536

Spring 2015

Homework #1

Due: Tuesday, March 17, 2015
Not accepted after class on March 24, 2015

#1   Write a regular expression that defines a C-like comment whose body is delimited by `/*` and `*/`. Individual `*`'s and `/`'s may appear in the comment body, but the pair `*/` may not.

#2   Write a finite automaton that accepts non-empty strings of a's and b's with the property that each character must appear *at least* twice. The following strings are allowed: abab, baabb, bbaa, and aabbaba. The following strings are not allowed: a, abb, λ, bbba, and bbabb.

#3   Show an NFA that corresponds to the following regular expression:
$$(a \mid aa \mid ba)^{+}$$
Using MakeDeterministic, translate the NFA into a DFA.
Optimize this DFA by merging states whenever possible.

#4   Is the set of binary strings (over 0 and 1) that represent even positive integers a regular set? Why? Is the set of binary strings (over 0 and 1) that represent positive integers evenly divisible by 3 a regular set? Why?

#5   Let Delete1 be the operator that systematically removes the first character from a set of non-null strings. For example, Delete1({abc,xy,a,b,bb}) = {bc,y,λ,b}. Let R be any regular expression that does not generate λ. Show that Delete1(R) is a regular set.