

# CS 536

Fall 2012

## Homework #1

Due: Monday, October 29, 2012

**Not accepted after class on November 5, 2012**

- #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, b's and c's with the property that each character must appear *at least* once. The following strings are allowed: `abcb`, `baacc`, `cbaa`, and `aabbaca`. The following strings are not allowed: `a`, `abb`,  $\lambda$ , `bbbc`, and `bbabb`.
- #3 Show an NFA that corresponds to the following regular expression:  
 $(a \mid b \mid ab \mid ba)^*$   
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 last character from a set of non-null strings. For example, `Delete1({abc,xy,a,b,bb}) = {ab,x, $\lambda$ ,b}`. Let `R` be any regular expression that does not generate  $\lambda$ . Show that `Delete1(R)` is a regular set.

