CS154 Assignment 2

January 17, 2001

Please submit every problem on a separate sheet.
Assignment due: 01/24/2001 at 3:15pm.

1. Sipser 1.12(b)
2. Sipser 1.16(b)
3. Sipser 1.24
4. Prove: if a language is regular then so is its complement. (The complement of a language L consists of all strings over the given alphabet that are not in L.)
5. Prove: Any non-empty regular language must contain a string whose length is less than the number of states of the minimal DFA accepting the language.

Extra credit problem (optional): Prove : If L is regular so are

$$Cycle(L) = \{xy \mid yx \in L\}$$

and

$$Half(L) = \{x \mid \text{there is a string } y, |y| = |x| \text{ and } xy \in L\}$$

Here x and y are strings and $|x|$ refers to the length of x (with $|\epsilon| = 0$).
If n is the size of DFA accepting L, give a bound on the size of the DFA accepting $Cycle(L)$ and $Half(L)$.