CS 2800 - Homework 10 - Due May 5
at the beginning of lecture

INCLUDE THIS COVER PAGE WITH YOUR HOMEWORK

NETID:

NAME:

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problem	grade	memo
1		
2		
3		
4		
5		
total		

You should justify/prove all your answers.

Problem 1

Suppose Σ is a finite alphabet and $A \subseteq \Sigma^*$ is a set of strings with characters from Σ.

Prove or disprove each of the following statements

(a) $A \subseteq A^2$

(b) $A\{\lambda\} = A$

(c) $A^*A = A^*$

(d) if $A = A^2$ then $\lambda \in A$

(e) $(A^*)^* = A^*$

Problem 2

Let $\Sigma = \{0, 1\}$. Construct a deterministic finite state automata recognizing

(a) strings that do not contain three consecutive 0s.

(b) strings that contain an even number of 0s and an odd number of 1s.

(c) the language defined by the regular expression $(10)^* \cup (01)^*$

Problem 3

Let A be the set of all 0/1 strings that contain the same number of 0s and 1s. For example, $00100111 \in A$, while $00011 \notin A$.

Show that no finite state automata can recognize A.

Problem 4

Let $\Sigma = \{0, 1\}$ Construct regular expressions that express the following languages:

(a) The set of strings containing a string of k ones, where k is any integer equal to 2 modulo 3, followed by an odd number of 0s.

(b) The set of bit strings of even length.

Problem 5

Show that if A and B are regular languages than

(a) $A \cup B$ is regular.

(b) $A - B$ is regular.

Hint: build machines that recognize these sets using machines that recognize A and B.