

Name(s) _____

CS503
Homework #1

Directions: Please put your final answers on this sheet.

#0. Name some alternative notations for

- a) The empty string

- b) Union of Regular Expressions (Sets)

- c) Complement of a Set

- d) Something else related to the first 2 modules

(And it's ok to post these to the bb)

#1. (10 Points) *True or False:*

- a) Given a language (set of strings) L , the question: "Is it raining" is a decision problem:
T F

- b) $\{\varepsilon\}$ is the empty language T F

- c) For sets A and C , $\sim(A \cap C) = \sim A \cup \sim C$ T F

- d) DFA's may fail to either accept or reject a string T F

- e) There exist formal languages which are not regular T F

- f) Given an alphabet Σ and a regular language $L \subseteq \Sigma^*$, the strings in $\Sigma^* - L$ are not in L
T F

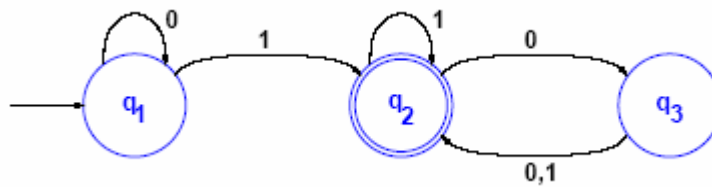
Proofs:

#2. (10 Points) Prove that the function $f: \mathcal{N} \rightarrow \mathcal{N}$ defined by $f(n) = n^2 + 1$ is one-to-one but not onto.

#3. (10 points) Prove, using induction that $(w^R)^i = (w^i)^R$
Be sure to state what you are doing the induction on.

DFA's

#4. (10 Points) What set of strings does the following automaton accept?



#5. (10 Points) Construct a dfa to accept all strings containing an even number of zeros and an even number of ones.