

Name(s) _____

CS503
Homework #2

Directions: Please put your final answers on this sheet.

#0. Name some alternative notations for

- a) dfa's
- b) Extended transition function
- c) Something else related to this module

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

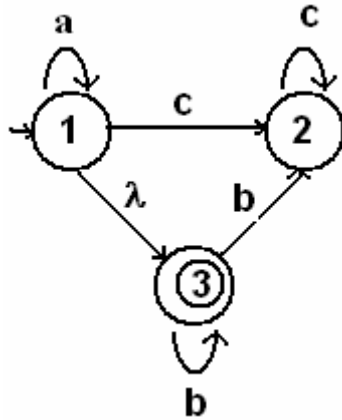
#1. (10 Points) *True or False:*

- a) Given a language (set of strings) L , the question: "Is it raining" is a decidable decision problem: T F
- b) $\delta^*(q,a) = \delta(q,a)$ where δ^* is the extended transition function: T F
- c) Languages accepted by NFA's are closed under concatenation: T F
- d) The smallest dfa accepting a^* (where $\Sigma = \{a\}$) has 2 states T F
- e) There may be more than 1 start state in an NFA T F

#2. (10 Points) Given a DFA, M , with transition function δ , prove by induction on $|y|$ that $\delta^*(q, xy) = \delta^*(\delta^*(q,x),y)$ for all states q and all strings $x, y \in \Sigma^*$.

3. (10 Points) Convert the following NFA, \mathcal{N} , to a DFA, \mathcal{M} , and describe $\mathcal{L}(\mathcal{M})$ (which should also = $\mathcal{L}(\mathcal{N})$).

\mathcal{M} :



#4. (10 points) Given: *An Identifier consists of a Letter followed by any number of Letters or Digits*, create a finite automaton to accept these Identifiers. Show a computation on the Identifier *R2d2* and *2d2R*.

#5. (10 Points) a) Create a DFA that recognizes the set of all binary strings having a substring *00*.

b) Create a DFA that recognizes the set of all binary strings ending in *01*.

c) Create an NFA that will accept the set of all binary strings having a substring 00 **or** that end in 01 .

d) Use the product construction to create a DFA that will accept the same language as in part c.

e) Use the Product Construction to create a DFA that will accept the set of all binary strings having a substring 00 **and** that end in 01 .

