Homework #1

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

a) Given a language (set of strings) L, the question: "Is string w ε L" is a decision problem: T F

b) Φ = {ε} T F

c) For sets A and C. ~ (A ∪ C) = ~ A ∪ ~ C T F

d) There is only 1 dfa that accepts a* T F

e) Given an alphabet Σ and a regular language L ⊆ Σ*, the strings in L' = Σ* - L form a regular language T F

Proofs:

#2. (10 Points) Given that an integer n is even if there is an integer i such that $n = 2 * i$ and an integer n is odd if there is an integer i such that $n = 2 * i + 1$, prove that for every integer $n \geq 0$, n is either even or odd, but not both.

#3. (10 points) Given an alphabet Σ, and a string x in Σ *, define the reversal of x, denoted x^R as:

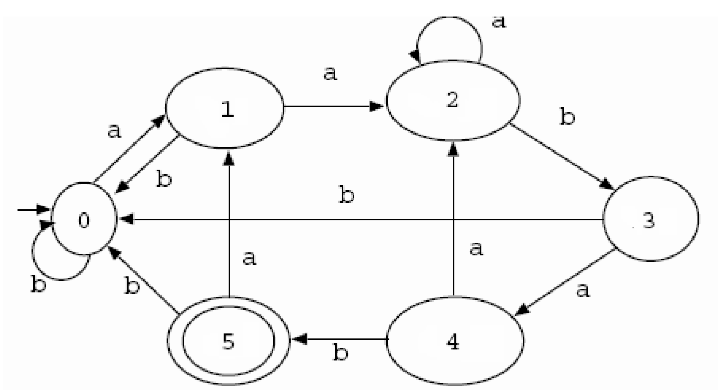
a) If length(x) = 0, then $x = \varepsilon$ and $\varepsilon^R = \varepsilon$
b) If length(x) = n>0, then $x = wa$ for some string w with length n – 1 and some a in Σ, and $x^R = aw^R$.

Using this definition, the definition of concatenation and associativity, prove by induction that: $(xy)^R = y^R x^R$.

#4. (5 Points) Disprove: All WPI computer science professors are men.

DFA's

#5. (5 Points) What set of strings does the following automaton accept?



#6. (10 Points) Create a DFA that accepts an odd number of *a*'s

#7. (Best ones will be posted to the bb) Give applications in Computer Science or in the world that use

a) strings
b) languages
c) regular sets
d) finite automata
e) proofs