Week 3 CS-312 Homework

Cory Ness Jack Engledow James Sgrazzutti

October 22, 2020

1 Problem 3.1

1.1 Question

Give an NFA for the language of RE $a^*b + b^*a$

1.2 Answer

2 Problem 3.6

2.1 Question

Show how to modify an NFA to have a unique accept state with no transition ending at the start state and no transition starting at the accept state.

2.2 Answer

3 Problem 3.7

3.1 Question

If M is a DFA accepting language B, then exchanging the accept and reject states gives a new DFA accepting teh complement of B. Does this work for an NFA? Discuss.

3.2 Answer

4 Problem 3.9

4.1 Question

For the following NFA, use the subset construction to produce an equivalent DFA.

4.2 Answer

5 Problem 3.11

5.1 Question

Provide an algorithm to tell if the language is infinite if the input is

5.1.1 An RE

5.1.2 An NFA

6 Problem 4.1

6.1 Question

Show that the set of regular languages is closed under reversal. That is, if L is regular, then so is $\{x^R : x \in L\}$ where x^R denotes the reversaal of string x.

6.2 Answer

7 Problem 4.11

7.1 Question

Show taht $\{x\#x : x \in \{0,1\}^*\}$ is nonregular. (The hash mark/pound sign is a special symbol that should only occur in the middle of the input string.)

7.2 Answer

8 Problem 4.13b

8.1 Question

State whether the set of binary nonpalindromes is regular or not. If not, give a proof that it is nonregular.

8.2 Answer

9 Problem 4.14

9.1 Question

Explain what is wrong with the following "proof" that the language L of an RE a^*b^* is nonregular.

> Suppose L were regular. Then it would be accepted by a DFA with, say, k states. Consider the string $z = 0^k1^k$. Split $z = uvw$ with $v = 01$. Then uv^2w is not in L. This is a contradiction of the Pumping Lemma, and so our supposition is false.

9.2 Answer

10 Problem 4.20

10.1 Question

Convince your grandmother that there is no FA that accepts the language of binary strings with an equal number of 0's and 1's.

10.2 Answer