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1-26-2016

CSCI 402

Assignment 2

1.7.2(a)

Thm: .

Basis:

Let By definition, The reversal of the empty string is equal to the string. So,

Induction Hypothesis:

Assume that for any string *w,*

Inductive Step:

Let and

By definition,

We can also conclude by the proof found on pg. 43-44 in “Elements of the

Theory of Computation” by Harry R. Lewis and Christos G. Papadimitriou

that

Using this we can now say

, a is a single element

by the Induction Hypothes

1.7.5

(a)

Strings that work:

1. w = aaaaaa
2. w = bbbbbb
3. w = abbaab

Strings that don’t work:

1. w = aaaaabbaab
2. w = abbbbbbbbb
3. w = bbaaaabbba

(b)

Strings that work:

1. There are no strings under the alphabet {a,b}, that will meet this criteria

Strings that don’t work:

1. w = aaa
2. w = bbbaaabba

(c)

Strings that work (uv = vu = w):

1. w = ababab
2. w = bababababa

Strings that don’t work:

1. There is no string *w* that will not work for this language.

(d)

Strings that work:

1. w = aa
2. w = aaaa
3. w = bbbb

Strings that don’t work:

1. w = aaa
2. w = abba

1.7.6

The case where is when the empty string is NOT an element of L.

This is because .

1.8.2

1. (aUb)\*
2. (aUb)\*
3. (aUb)\*
4. There is no further simplification for this regular expression. Therefore the simplest expression is as stated. (aUb)\*a(aUb)\*

1.8.3

1. b\*(aUe)b\*(aUe)b\*(aUe)b\*
2. (b\*ab\*ab\*ab\*)\*
3. (b U ab U aab)\*aaa(b U ba U baa)\*

1.8.5

1. True, this string is a part of the language represented by a\*b\*a\*b\* because there are no more than 2 *a*’s separated by a *b*, and no more than 2 *b*’s separated by an a.
   1. a\* = e, b\* = b, a\* = aa, b\* = e
2. False, for the statement to be true according to the RHS, only all *a*’s, all *b*’s, or *e* would be allowed. The LHS allows there to be *a*’s and *b*’s in the same string, which violates the rules of the RHS.
3. False, there are strings that exist in the set a\*b\*∩b\*c\*. One such example would be any strings containing all *b*’s.
4. False, according to the regular expression, *cd* can never appear after a *b*.