Homework #1 - 317

Mark Shinozaki

1. • $0(10+0)^*11$

→ in language ←

$0(10+0)^*11$

This means that all possible strings that start with 0/zero end with 11. This also means we can have 10 or 0 in between the start and end of the string.

→ 0111
→ 0011
→ 011

→ counter ←

0 0 0 1 0
0 1 1 0

• $[0+110)^*|(01+1)^*$

→ in language ←

$\underline{(0+110)^*|(01+1)^*}$

↓

00111

→ Counter ←

$\underline{(0+110)^*|(01+1)^*}$

↓

1 0 0 0

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2.

(1) All strings containing more than two 0's

- $(0+1)^*0.(0+1)^*0(0+1)^*$

(2) All strings do not contain 01

- $1^*|0^*(0+1)^*$

(3) All strings contain both 101 and 011 as substrings

$[(0+0^*11^*00)|(0+1^*0111)011(1+0)^*]$

and

$[(1+1^*00|0)0(0+0^*|11)111(0+1)^*]$

4) All strings do not ended with 01

$(0+1)^*(10+00+11)$

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3.

1. $L_1 L_1^* = L_1^* L_1 L_1^*$

$L_1^* = \{0, 1, 01, 10, 100, \ldots\}$

$LHS = L_1 L_1^* = \{0, 1, 00, 01, 001, 101, \ldots\}$

$RHS = L_1^* L_1 L_1^* = \{0, 1, 00, 01, 001, 101, \ldots\}$

True.

2. $(L_1^* L_2)^* L_1^* = (L_1 + L_2)^*$

$L_1^* L_2 = \{0, 1, 01, 10, L_2\}\{10, 01, 00, 11\}$

$= \{L_2 \cdot 1, 11, 00, 001, 011, 010, 000, \ldots\}$

$(L_1^* L_2)^* = \{01, 11, 10, 00, 011, 011, \ldots\}$

$LHS \rightarrow \{01, 10, 11, 00, 011, 0111, \ldots\}\{0, 1, 01, 10\} =$

$\{0, 1, 101, 11, 00, \ldots\}$

→

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3.

$L_1 + L_2 = \{0, 1\} + \{01, 11, 10, 00\} = \{0, 1, 01, 10, 11, 00\}$

$(L_1 + L_2)^* = \{\epsilon, 0, 1, 01, 10, 11, 00 \ldots\}$

LHS = RHS

This is true.

4.

Show through an example why LHS is not true:

For any languages L_1 and L_2 we have $L_1^* + (L_1^* L_2)^* = (L_1 + L_2)^*$

$L_2 = \{b\}$

$L_1 = \{\epsilon, a, aa, \ldots\}$ $\quad L_1 = \{a\}$

$L_1^* L_2 = \{b, ab, aab, \ldots\}$

$L_1^* + (L_1^* L_2)^* = \{\epsilon, a, aa, \ldots\} + \{\epsilon, ab, bb, ab, abb, abab, aabaab, aab\}$

$(L_1^* + (L_1^* L_2)^*) = \{\epsilon, a, b, aa, bb, ab, abab, aabaab, \ldots\}$

$(L_1 + L_2)^* = (a + b)^*$

$\Rightarrow \{\epsilon, a, b, aa, bb, aaa, bbb \ldots\}$

$L_1^* + (L_1^* L_2)^* \neq (L_1 + L_2)^*$ ← This is not true

Homework #1 → 817

Mark Slivozaik

5.

(C) → 2 clowns and 1 Damsel

↓

As, this satisfies both rules

1: There are two kinds of fish in the tank

this is

Satisfied

2: the tank has at least 1 clown, only 1 damsel can be there in the tank

by this statement it is

satisfied as well

6.

damsels = D

Clowns = C

$(D)^n$ represents the sequence in regular expression

here n=3 clowns are $(C)^M$ and n=3 then 2 clowns

1 damsel $(C)^n D$ now, $(D)^M \rightarrow (C)^M \uparrow (C)^n D = M=3, n=2$