Gradiance Online Accelerated Learning

Zayd

- Home Page
- Assignments Due
- Progress Report
- Handouts
- Tutorials
- Homeworks
- Lab Projects
- Log Out

Help

Submission number:	61152
Submission certificate:	CF529458
Submission time:	2014-02-16 19:43:58 PST (GMT - 8:00)

Number of questions:	8
Positive points per question:	3.0
Negative points per question:	1.0
Your score:	24

Based on Section 4.2 of HMU.

1. The operation Perm(w), applied to a string w, is all strings that can be constructed by permuting the symbols of w in any order. For example, if w = 101, then Perm(w) is all strings with two 1's and one 0, i.e., Perm(w) = {101, 110, 011}. If L is a regular language, then Perm(L) is the union of Perm(w) taken over all w in L. For example, if L is the language L(0*1*), then Perm(L) is all strings of 0's and 1's, i.e., L((0+1)*).

If L is regular, Perm(L) is sometimes regular, sometimes context-free but not regular, and sometimes not even context-free. Consider each of the following regular expressions R below, and decide whether Perm(L(R)) is regular, context-free, or neither:

1. (01)*
2. 0*+1*
3. (012)*
4. (01+2)*

a) Perm(L(0*+1*)) is regular.

b) Perm(L((01+2)*)) is regular.

c) Perm(L((012)*)) is context-free but not regular.

d) Perm(L((01+2)*)) is not context-free.

Answer submitted: **a)**

You have answered the question correctly.

2. If *h* is the homomorphism defined by h(a) = 0 and h(b) = ε, which of the following strings is in h^{-1}(000)?

a) abbbabaab

b) babab

c) abbabaab

c) abbabaab

d) baabba

Answer submitted: **d)**

You have answered the question correctly.

3. Let *h* be the homomorphism defined by h(a) = 01, h(b) = 10, h(c) = 0, and h(d) = 1. If we take any string w in (0+1)*, $h^{-1}(w)$ contains some number of strings, N(w). For example, $h^{-1}(1100)$ = {ddcc, dbc}, i.e., N(1100) = 2. We can calculate the number of strings in $h^{-1}(w)$ by a recursion on the length of w. For example, if w = 00x for some string x, then N(w) = N(0x), since the first 0 in w can only be produced from *c*, not from *a*.

Complete the reasoning necessary to compute N(w) for any string *w* in (0+1)*. Then, choose the correct value of N(110011001).

a) 8

b) 256

c) 55

d) 16

Answer submitted: **d)**

You have answered the question correctly.

4. h is a homomorphism from the alphabet {a,b,c} to {0,1}. If h(a) = 01, h(b) = 0, and h(c) = 10, which of the following strings is in $h^{-1}(010010)$?

a) *abcb*

b) *bcab*

c) *baba*

d) *cbbc*

Answer submitted: **b)**

You have answered the question correctly.

5. Find, in the list below, a regular expression whose language is the reversal of the language of this regular expression: (0+1)01*. Recall that the reversal of a language is formed by reversing all its strings, and the reversal of a string $a_1a_2...a_n$ is $a_n...a_2a_1$.

a) 01*(0+1)

b) 1*0(0+1)

c) 1*(0+1)0

d) 0(0+1)1*

Answer submitted: **b)**

You have answered the question correctly.

You have answered the question correctly.

6. The operation DM(L) is defined as follows:

1. Throw away every even-length string from L.
2. For each odd-length string, remove the middle character.

For example, if L = {001, 1100, 10101}, then DM(L) = {01, 1001}. That is, even-length string 1100 is deleted, the middle character of 001 is removed to make 01, and the middle character of 10101 is removed to make 1001.

It turns out that if L is a regular language, DM(L) may or may not be regular. For each of the following languages L, determine what DM(L) is, and tell whether or not it is regular.

- L_1: the language of regular expression (01)*0.
- L_2: the language of regular expression (0+1)*1(0+1)*.
- L_3: the language of regular expression (101)*.
- L_4: the language of regular expression 00*11*.

Now, identify the true statement below.

a) DM(L_3) is not regular; it consists of all strings of the form $(101)^n(00+11)(101)^n$.

b) DM(L_1) is regular; it is the language of regular expression (01)*(10)*.

c) DM(L_4) is regular; it is the language of regular expression 00(00)*(11)* + (00)*11(11)* + 0(00)*1(11)*.

d) DM(L_4) is not regular; it consists of all strings of the form 0^n1^n.

Answer submitted: **c)**

You have answered the question correctly.

7. The language of regular expression (0+10)* is the set of all strings of 0's and 1's such that every 1 is immediately followed by a 0. Describe the complement of this language (with respect to the alphabet {0,1}) and identify in the list below the regular expression whose language is the complement of L((0+10)*).

a) (0+10)*11(0+1)*

b) (0+1)*11(0+1)* + (0+10)*1

c) (0+10)*11(0+10)* + (0+1)*1

d) (0+1)*1(ε+11(0+1)*)

Answer submitted: **b)**

You have answered the question correctly.

8. The homomorphism *h* is defined by h(a) = 01 and h(b) = 10. What is h(bbba)?

a) 10101001

b) 10101010

c) 101001

d) bbba

Answer submitted: **a)**

You have answered the question correctly.