HW1

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1. Give a regular expression, simplified to the best of your abilities, for the language of all strings of as, bs, and cs where a is never immediately followed by b.

$\sum = \{ a, b, c\}$

$(b + c)^*(c + cb + ac)^*$

2. Give a regular expression, simplified to the best of your abilities, for the language of all strings of as, bs, and cs that contain an even number of bs.

$\sum = \{ a, b, c\}$

$(a + c)^* + ((a + c)^*b(a + c)^*b)^*$

3. Simplify (if possible) the expression $(a+b+c)^*(a+b)^*$, then describe as concisely as you can in English the language it defines.

This regular expression is equal to $(a^*b^*c^*)^*(a^*b^*)^*$ and be reduced to $(a^*b^*c^*)^*$. In english it essentialy means that the language created from it has a general form of a-b-c and this form can repeat with repeating letters such as aaa-bbb-cc-aa-bb-cc.

4. Simplify (if possible) the expression $(a+b)^*c^*(a+b)^*$, then describe as concisely as you can in English the language it defines.

This could be simplified/converted to $(a^*b^*)^*c^*(a^*b^*)^*$. In english it essentialy means a language of the form where a-b-c-a-b where there is a number of c's or none in the middle but on the outside there is a pattern of a-b where they can repeat the characters and the the pattern such as aa-bb-aa-bb in that order.

5. Define a DFA, simplified to the best of your abilities, for the language of all strings of as, bs, and cs where a is never immediately followed by b.

Q = $\{ s_0, s_1, s_2, s_3\}$
$\sum = \{ a, b, c\}$
$\delta =$

Current	a	b	c
s_0	s_0	s_2	s_1
s_1	s_0	s_2	s_1
s_2	s_3	s_2	s_1
s_3	s_3	s_3	s_3

M = $\{ Q, \sum, \delta, s_0, Q\}$

6. Define a DFA, simplified to the best of your abilities, that recognizes the language
L = $\{ w \in \{ a, b\}^* : |w|_a \bmod 3 = 0 \}$

Q = $\{ s_0, s_1, s_2\}$
$\sum = \{ a, b\}$
$\delta =$

Current	a	b
s_0	s_0	s_0
s_1	s_1	s_1
s_2	s_2	s_2

$$\mathrm{M} = \{\ Q, \sum, \delta, s_0, \{\ s_0\}\ \}$$