Assignment #3

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CSCE 433: Formal Languages and Automata

February 23, 2016

Question 1. Find the smallest string in $\{a, b\}^*$ not in the language corresponding to the given regular expressions.

(a) $b^*(ab)^*a^*$

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

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

(a)

This regular expression accepts any string with lenght less or equal to 2. To make a string that is not accepted we can put a b in the end of the string, considering the fact that this string can't be of format $b^*(ab)^*$ because it would be accepted. The string abb, for instance, is not accepted and it is minimal because any string with size less then abb is accepted.

(b)

We can see that this regular expression accepts any string with length less or equal to 3. Also, the look of a string accepted by this language is one that has 3 or less sequences of a's and b's; if we have more than 3 sequences the string won't be accepted. Therefore, the string $abab$ is not accepted and is minimal since any string with length less than 4 is accepted.

(c)

First let's observe that any string with size less or equal to 2 is accepted by this language. To find a string not accepted by this regular expression we are going to exploit the fact that the term in the middle ($baa*$) repeats the string ba everytime that it is repeated. Then, if we have a string that starts with bb the first (a^*) and second ($(baa*)^*$) sequences are not in this string, therefore this string should have just b's, then bba is not accepted by the language and it is minimal since every string with size less then 3 is accepted.