CS311 Quiz#3 (winter 99)

Student Name (please print):

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Problem 1. Circle the strings that are part of the language described by the following regular expression

$$(b^*ab^*a)^+\, b^+ \cup \left(a^+ba^+b\right)^*\, a^*ba^*$$

1) $abaabbabaa$
2) λ
$\boxed{3)}$ $bbbaaababb \quad = (b^3ab^0a)(b^0ab^1a)b^2$
$\boxed{4)}$ $abaabaaaba \quad = (aba^2b)^1a^3ba$
5) $bababababa$

The first expression

$$(b^*ab^*a)^+\, b^+$$

denotes the set of strings with a nonzero, even number of a's and with the last letter b. The third string is of this form.

The second expression

$$\left(a^+ba^+b\right)^*\, a^*ba^*$$

denotes the set of strings with a nonzero, odd number of b's; if there are 3 or more $b's$ then the string starts with an a, and all b's are separated by a's, possibly with the exception of last pair of b's. The fourth string is of this form.

λ cannot be generated by either expression because generated strings need to contain at least one b.

Strings 1) and 5) end in a, hence they cannot be generated by the first expression; string 1) has 4 b's, hence cannot be generated by the second expression either. String 5) has 5 b's, but starts with a b, hence is not generated by the second expression.

Problem 2. Give a regular expression that describes the set of strings over $\{a, b, c\}$ that do not contain "aaa". *Hint: all possible appearances of "aa" have to be followed by a "b" or a "c". Make sure that your expression generates simple strings like "ab", "ba", "baa" also.*

$$(b \cup c \cup ab \cup ac \cup aab \cup aac)^*(\lambda \cup a \cup aa) = ((\lambda \cup a \cup aa)(b \cup c))^* (\lambda \cup a \cup aa)$$