# Regular Expressions Practice Set

Did you know: *Regular expressions have been studied for nearly 50 years, yet many intriguing problems about their descriptive capabilities remain open [to interpretation].*

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How I attempt solving Regular Expressions:

Step 1: Enumerate the simple obvious cases for the language (only give it 15 seconds)

Step 2: Enumerate ALL the possible EDGE cases (give it a good hard 3 to 4 minutes)

Step 3: Start thinking about the regular expression from the PoV of Edge cases NOT the simple cases

Step 4: After drawing up an RE, brute force check it for all obvious and edge cases and see if any missing string is found or wrong string is generated

Step 5: If the RE is incorrect, identify the 'Leak(s)' and start fixing it by rearranging the RE appropriately

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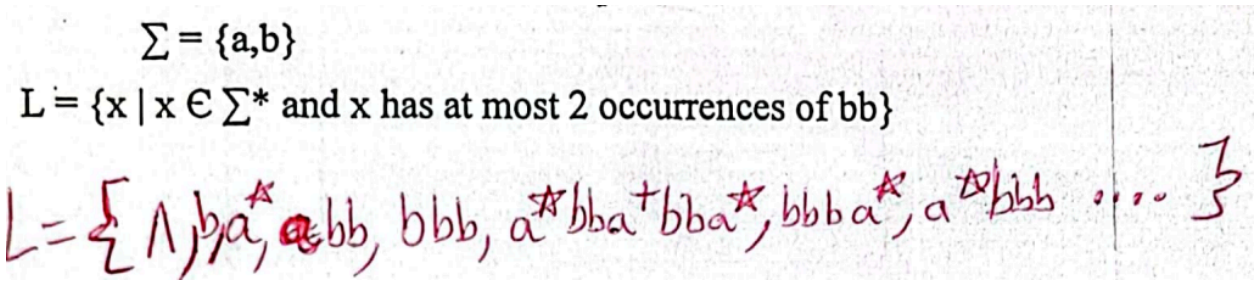
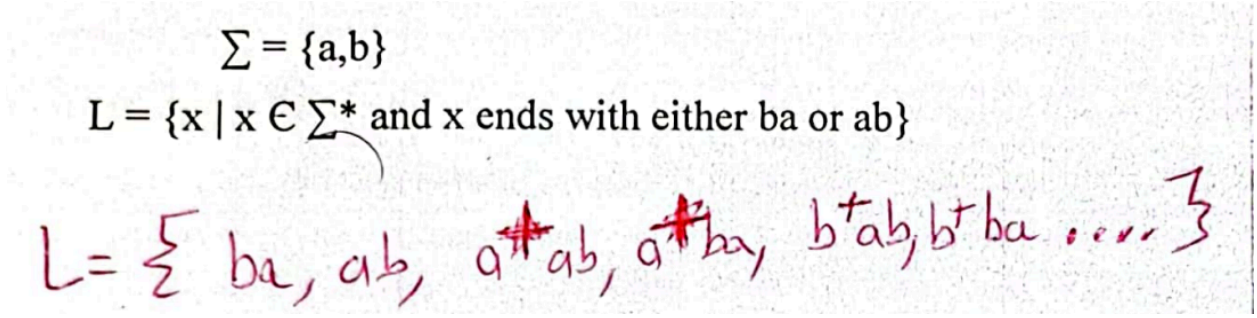
Quiz 1 Regular Expressions




A) a*( ^ + (b+bb+bbb+bba$^{+}$bb+bba$^{+}$(b*a$^{+}$)*bb) + ( (aba*)* + (a*ba)* ) )a*

**This above RE is partially incorrect! It fails to generate the edgecase "bbababb". If you are able to solve it, Email me your Solution. This error was pointed out by a student. Can YOU solve it? Try to. And let me know as well!**

**Update: I have solved it with another student, Let me know if you guys find further issues in it!**




A) (a*b*)*(ab+ba)

# Regular Expressions Practice Set

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

$$L = \{x \mid x \in \sum^* \text{ and } x \text{ has at least 2 occurrences of bb}\}$$

$L = \{bbb, a^*bbb^+a^*, a^*bba^*bba^*(bb)^*a^*, \ldots\}$

A) (a*b*)*(bbb+a*bba*bba*(bb)*)(a*b*)*

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Assignment Solution of RE will be posted here later after submission of assignment

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My quiz when I was studying Automata

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

$L = \{x \mid x \in \sum^* \text{ \& } |x| \text{ is multiple of 3 and every ith position in x should contain b, where i= multiple of 2}\}$

A) ^ + (aba + abb + bbb)(bab + bbb)(aba + abb + bbb)

**This one is particularly tough and I have implemented it partially. If any of you is able to crack it, you can email me with the solution so that I can update it here!**

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**Language 1**. The language of all strings over {a, b} such that the as and bs are strictly alternating.

Examples of strings in the language: ε, a, b, ab, ba, aba, bab, abab, baba

Examples of strings not in the language: bb, aa, abba

Answer: (ab)*(a|e)|(ba)*(b|e)

**Language 2**. The language of all strings over {a, b} that begin with "aba" and end with "bb".

Examples of strings in the language: ababb, ababb, ababbb, ababbababb

Examples of strings not in the language: ε, aba, abab, abb

Answer: aba(a|b)*bb

**Language 3**. The language of all strings over {a, b} such that the as always occur in groups of 2 or more.

Examples of strings in the language: ε, b, bbbb, aa, aaa, aabaaabbaa, bbaabaaabaabaaa

Examples of strings not in the language: a, aba, abba, aabaaaaba

Answer: (b|(aaa*))*

**Language 4**. The language of all strings over {a, b, c} which start with "a" and which do not contain the substring "cb". (Note that this one is challenging as a regular expression.)

Examples of strings in the language: a, ab, abc, ac, acc, accab

Examples of strings not in the language: ε, b, c, acb, abbabcba

Answer: a(a|b|cc*a)*(cc*|e)

**Language 5**. The language of all strings over {a, b} such that the number of as is even and the number of bs is odd. (Note that this one is challenging as a regular expression.)

Examples of strings in the language: b, aab, baa, aba, aaaba, aababab

Examples of strings not in the language: ε, aa, abba, abbbabab

Answer: (aa|bb|abba|baab|abab|baba)*(aba|b)(aa|bb|abba|baab|abab|baba)*

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Input Set is 0 and 1 For the questions below:

Q) 0 or 11 or 101
  A) 0 | 11 | 101
Q) only 0s
  A) 0*
Q) all binary strings
  A) (0|1)*
Q) all binary strings except empty string
  A) (0|1)(0|1)*
Q) begins with 1, ends with 1
  A) 1 | (0|1)*|1
Q) ends with 00
  A) (0|1)*00
Q) contains at least three 1s
  A) (0|1)*1(0|1)*1(0|1)*1
Q) contains at least three consecutive 1s
  A) (0|1)*111(0|1)*
Q) contains the substring 110
  A) (0|1)*110(0|1)*

# Regular Expressions Practice Set

Q) doesn't contain the substring 110

A) (0|10)*1*

Q) contains at least two 0s but not consecutive 0s

A) (1*011*(0+011*))*

Q) has at least 3 characters, and the third character is 0

A) (0|1)(0|1)0(0|1)*

Q) number of 0s is a multiple of 3

A) 1*|(1*01*01*01)*

Q) starts and ends with the same character

A) 1(0|1)*1|0(0|1)*0

Q) odd length

A) (0|1)((0|1)(0|1))*

Q) starts with 0 and has odd length, or starts with 1 and has even length

A) 0((0|1)(0|1))*|1(0|1)((0|1)(0|1))*

Q) length is at least 1 and at most 3

A) (0|1)|(0|1)(0|1)|(0|1)(0|1)(0|1)

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