Automata Theory - Quiz II

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1 Instructions

1. Attempt as many problems as you can. You will be given partial credit.

2 Problems

1. Let L_1 and L_2 be 2 regular languages, over the same alphabet Σ and let them be respectively represented by DFAs A_1 and A_2. Discuss a strategy by which you could check whether there is a string in Σ^*, that is neither in L_1 nor in L_2. (3 points)

2. Consider the grammar $G = (\{S\}, \{a, b\}, P, S)$, where P is defined as the following set of rules:

$$S \rightarrow aSbS \mid bSaS \mid \epsilon$$

   Argue using mathematical induction, that $L(G)$ is the set of *all* strings with an equal number of $a's$ and $b's$. (4 points)

3. Write a CFG for the following language: $L = \{a^i b^j \mid i, j \geq 1, \ j = i + 1\}$. (3 points)