Automata and Formal Languages

Homework Set 4

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Problem 1 Do Exercise 1.12 (b) in the textbook.

Problem 2 Do Exercise 1.16 (b) in the textbook.

Problem 3 Let R_1, R_2, R_3, and R_4 be any regular expressions. Prove the following properties where the equality '=' means that the expressions on both sides represent the same language:

1. $R \cup \emptyset = R$;

2. $R \circ \epsilon = R$;

3. $(R_1 \cup R_2) \circ R_3 = (R_1 \circ R_3) \cup (R_2 \circ R_3)$;

4. $R_3 \circ (R_2 \cup R_1) = (R_3 \circ R_2) \cup (R_3 \circ R_1)$;

5. $(R_1^*)^* = R_1^*$.

Problem 4 Use the pumping lemma to prove that the following language is not regular:
$$A = \{www| \; w \in \{0, 1\}^*\}.$$