Section 4.1 #10

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10. (10pts) The symmetric difference of two sets S1 and S2 is defined as

$$S1 \ \theta \ S2 = \{x : x \in S1 \text{ or } x \in S2, \text{ but not in both S1 and S2}\}.$$

Show that the family of regular languages is closed under the symmetric difference.

Answer

$S1 \ \theta \ S2 = (S1 - S2) \cup (S2 - S1)$, closed under difference and union of regular languages, or

$S1 \ \theta \ S2 = (S1 \cup S2) - (S1 \cap S2)$, closed under union, intersection, and difference of regular languages or

$S1 \ \theta \ S2 = (S1 \cup S2) \cap \overline{(S1 \cap S2)}$, closed under union, intersection, and complement.

Grading: any one of the three ways would be fine. Need to mention closure property (or closed) under different operations. Partial points can be given.