Module 8 Homework sec 4.1 #10

10. The symmetric difference of two sets S_1 and S_2 is defined as $S_1 \ominus S_2 = \{x : x \in S_1$ OR $x \in S_2$, but NOT in both S_1 and $S_2\}$.

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

- S_1 and S_2 are regular sets.

$(S_1$ OR $S_2) = (S_1 \cup S_2)$ * union

$[$NOT $(S_1$ AND $S_2)] = \overline{(S_1 \cap S_2)}$ * compliment

$(S_1 \ominus S_2) = (S_1 \cup S_2) \cap \overline{(S_1 \cap S_2)}$ * symm diff = union AND compliment

- regular sets are closed under union, intersection, and compliment. The symmetric difference is a combination of these properties. If the sets are regular, then their symmetric difference is also regular.