1.

1) Union

Assume there is a Turing Machine M_1 that accepts the language L_1 with the alphabet $\Sigma_1 = \{a_1, a_2 \dots a_n\}$, and some Turing Machine M_2 that accpets the language L_2 with the alphabet $\Sigma_2 = \{b_1, b_2 \dots b_m\}$. By the Turing thesis we know that both M_1 and M_2 can be represented by a single tape single head machine. We can then construct $M_1 \cup M_2$ by making a two tape two head machine M_3 where the first tape is M_1 and the second tape is M_2 and $\Sigma_3 = \Sigma_1 \cup \Sigma_2$. The set of states and the set oftransitions will also be the union of the states and transitions in M_1 and M_2. For any input w you can run the two heads on w and if either of them reach their halting state then w will be accepted. By the Turing thesis we know that this multi tape Turing Machine can be converted into a single tape single head Machine.

2) intersection