

Problem set 5
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1. Design a deterministic FSA with alphabet $\{a,b,c\}$ that will recognize all and only the strings containing a substring of three *consecutive* symbols (three straight a's, three straight b's or three straight c's.) Do not use more than eight states!
2. The *complement* of a language is the set of all strings *not* in the language. Prove that if a language is accepted by an FSA, then its complement is.

Hint: The way to address this one is to consider what happens on a computation that accepts a string and on a computation that rejects a string. The only way to accept a string is to read the whole thing and terminate in a final state. The only ways not to accept a string are to read the whole thing and terminate in a non-final state, or to fail to read the whole thing (because some state lacks instructions for some letter). So to get a machine that accepts complementary string, just shuffle around the final states, and add one more final state (plus some transitions to this extra final state)

3. True or False? (In each case, explain your answer if the answer is yes, and provide a counter-example if it is no.)
 - a) Every subset of a regular language is regular.
 - b) If L is regular then so is the set $\{xy \mid x \in L \text{ and } y \notin L\}$