COMP4200 Fall 2020
Homework #1

1. Draw the state transition diagram for an automaton that recognizes the language consisting of all strings of 0's and 1's which have an even number of 0's and an odd number of 1's. Indicate the initial state with an arrow pointing to the start state whose tail does not point at another state, and circle the final states (as we did in class).
2. Describe the automaton from problem 1 as a 5-tuple (Q,Σ,δ,s,F) – give values for all 5 components.
3. We defined the operation of *concatenation* for sets of strings on p. 10,
   AB = { xy | $x \in$ A and $y \in B$ }
   Are the regular sets closed under concatenation? That is, if A and B are regular sets, is AB guaranteed to be a regular set? Prove or show a counterexample.

4. For each of the following sets, find a string of minimum length in {0,1}* that is NOT in the set described
   a) The set of all multiples of three, with leading zeroes allowed
   b) {1}*{01}*{0}*
   c) {0}{100,101}*