1 Regular Expressions and Finite Automata (20 points)
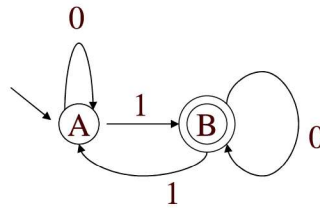
a) Draw a deterministic finite automaton (DFA) that recognizes the language over the alphabet $\{0,1\}$ consisting of all those strings that contain an **odd** number of 1's.
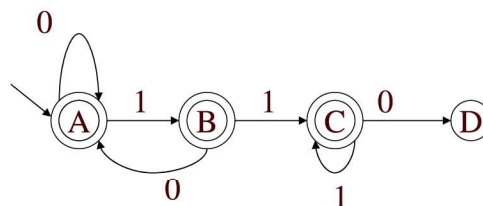

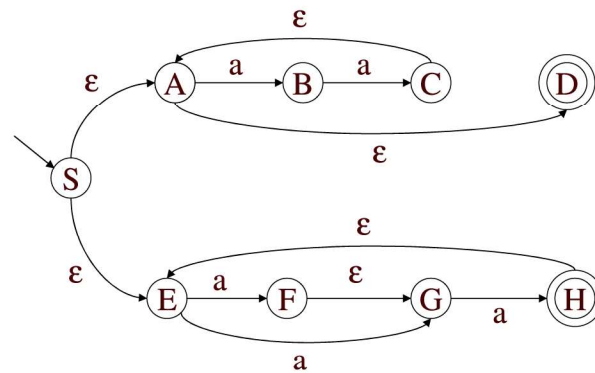
b) Write a regular expression for this language.

Solution:
$$(0^*10^*)(10^*10^*)^*$$

c) Draw a deterministic finite automaton (DFA) for the language of all strings over the alphabet $\{0,1\}$ that do **not** contain the substring 110.

Solution: (state D is a garbage state)

d) Consider the following NFA over the alphabet $\{a\}$. Convert this NFA to a DFA. For each DFA state write the set of the NFA states that it corresponds to.

Solution: