Key Assignment # 3.1

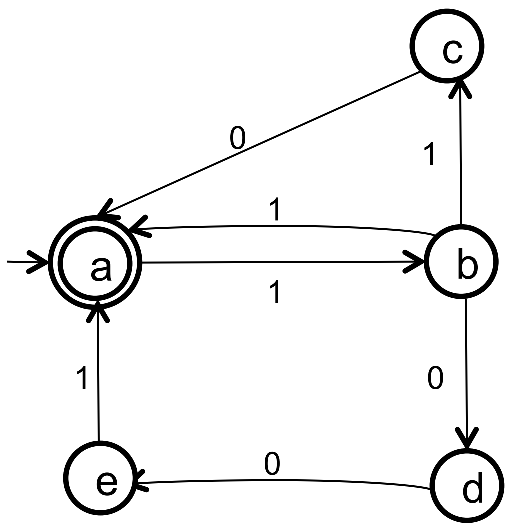
Present a transition diagram for a NFA that recognizes the set of binary strings that starts with a 1 and, when interpreted as entering the NFA most to least significant digit, each represents a binary number that is divisible by either five or six. Thus, 101, 110, 1100, 1111 are in the language, but 111, 1011 and 11010 are not.
OR
Present a DFA that recognizes such binary strings that represent a number that is either 5 Mod 6 or 0 Mod 6.

Construction:

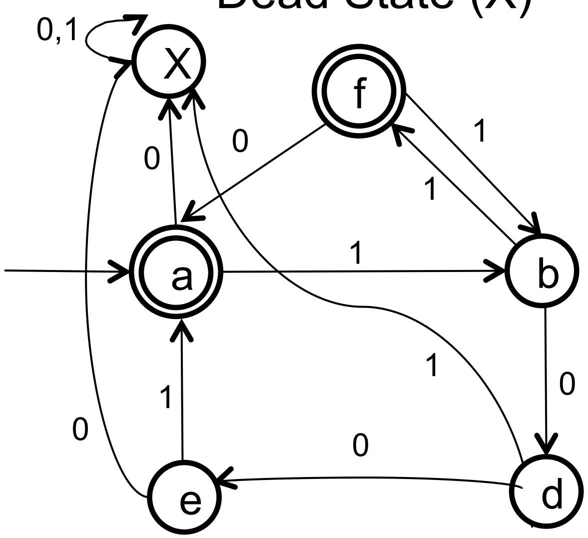
I can do on board, but these are simple variants of ones I already did.

Key Assignment # 3.2

a.) Present a transition diagram for an NFA for the language associated with the regular expression (1001 + 110 + 11)*. Your NFA must have no more than five states.
b.) Use the standard conversion technique (subsets of states) to convert the NFA from (a) to an equivalent DFA. Be sure to not include unreachable states. Hint: This DFA should have no more than six states.



* Dead State (X)



Sample Assignment # 3.3

Using DFA's (not any equivalent notation) show that the Regular Languages are closed under Min, where Min(L) = { w | w $\in$ L, but no proper prefix of w is in L}. This means that w $\in$ Min(L) iff w $\in$ L and for no y≠λ is x in L, where w=xy. Said a third way, w is not an extension of any element in L.

Let A = (Q, Σ, δ, q_0, F) be a DFA such that L = L(A).

Define A_{MIN} = (Q U {D}, Σ, δ', q_0, F), where D is not in Q.

δ' just changes δ so that, for each f in F, all its outgoing edges now point to state D, which loops on itself. All other outgoing edges from final states are removed. This means that all extensions of a word in L fail to be recognized. This is just the definition of MIN(L) recast in terms of the behavior of its accepting DFA.

There is a way that breaks out of the DFA and enters the domain of the NFA. One merely removes all edges that start at a final state. One would then need to recast as a DFA, so that's a bit of a cheat, but we will accept it.

A way that also somewhat ignores the constraint of a DFA is to note that DFAs are closed under intersection and complement and so under difference. At this point we can then show that Min(L) = L – L Σ^+. This is the proof most commonly found on net.