Key Assignment # 3.1

Present a transition diagram for a DFA that recognizes the set of binary strings that, when interpreted as entering the DFA most to least significant digit, each represents a binary number that is divisible by seven. Thus, 111, 001110 and 010101 are in the language, but 101, 1001 and 11001 are not.

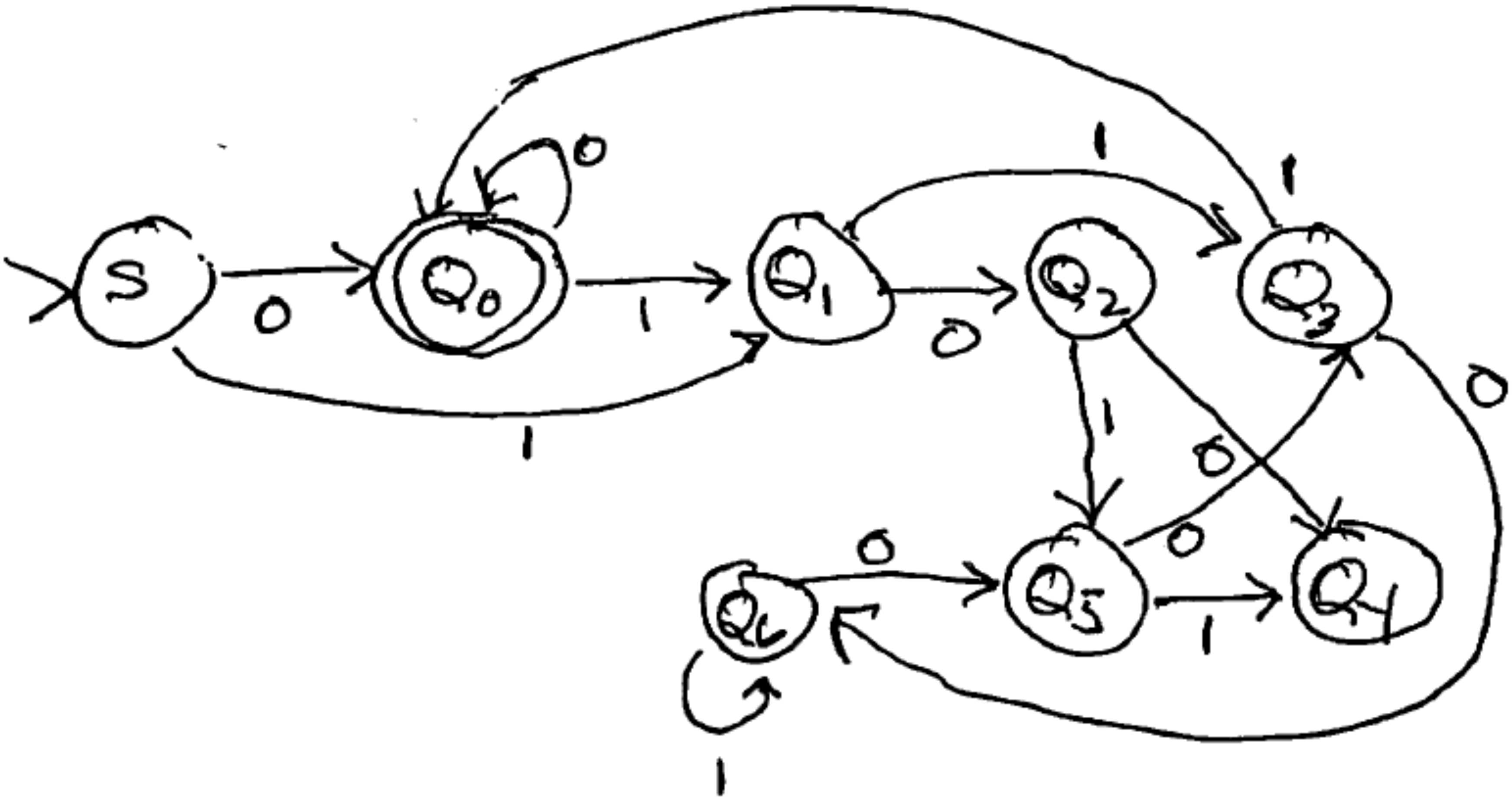
Construction:

DFA on next page. The basis for it follows:

$\mathbf{A = (\{S,Q_0,Q_1,Q_2,Q_3,Q_4,Q_5,Q_6\}. \{0,1), \delta, S, \{Q_0\})}$.

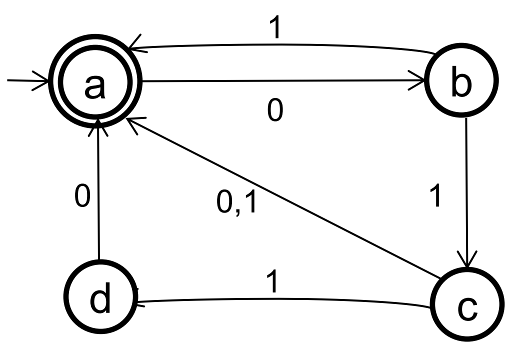
Can transition from state **S** on a 0 to state $\mathbf{Q_0}$ and on a one to state $\mathbf{Q_1}$. All other transitions are then from $\mathbf{Q_k}$ to $\mathbf{Q_{(2*k+b) \bmod 7}}$ on a **b** (0 or 1).

Assignment # 3.1 DFA



Key Assignment # 3.2

a.) Present a transition diagram with no lambda transitions for an NFA associated with the regular expression (011 + 0110 + 01 + 010)*.
Your NFA must have no more than four 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)