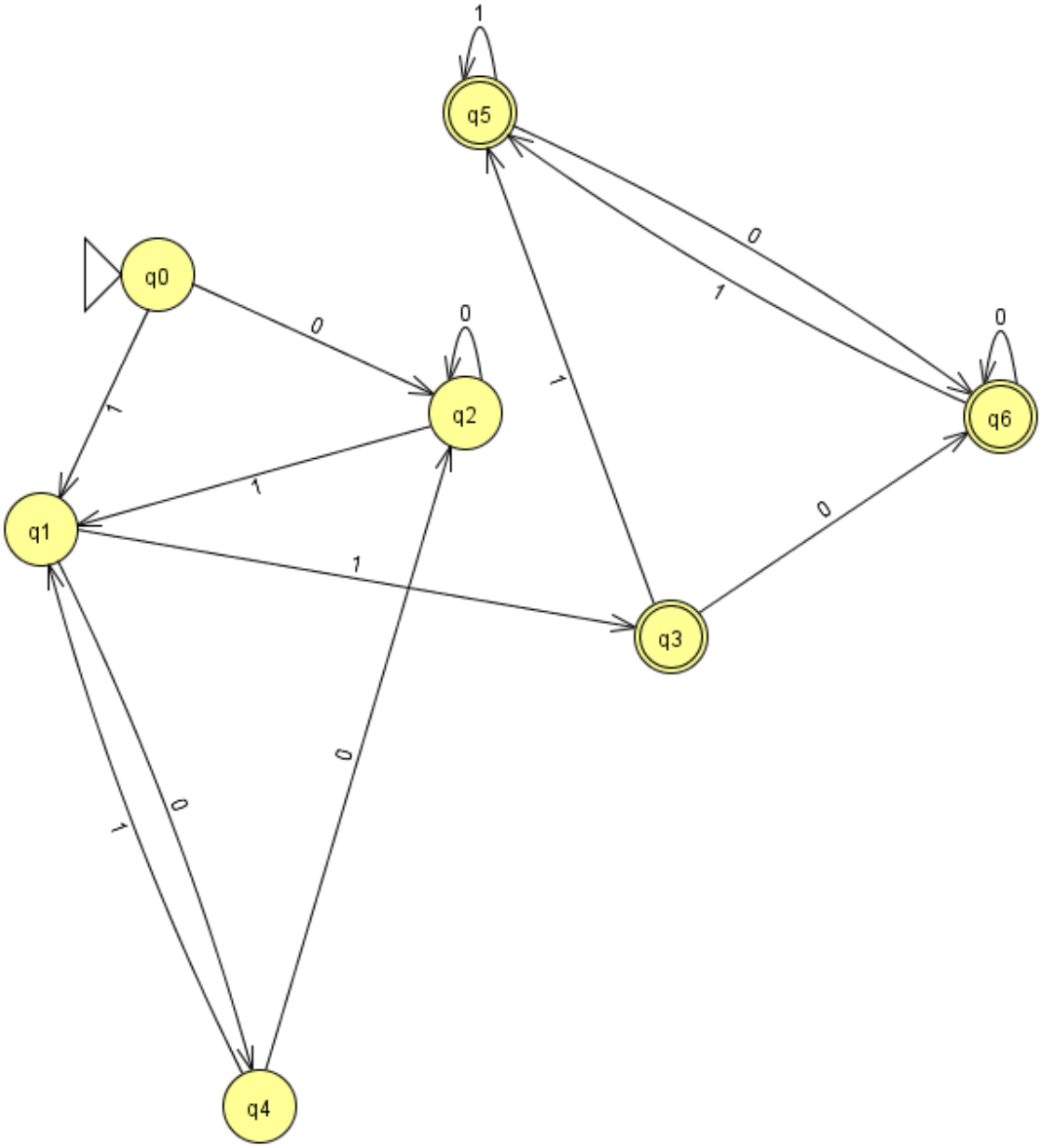
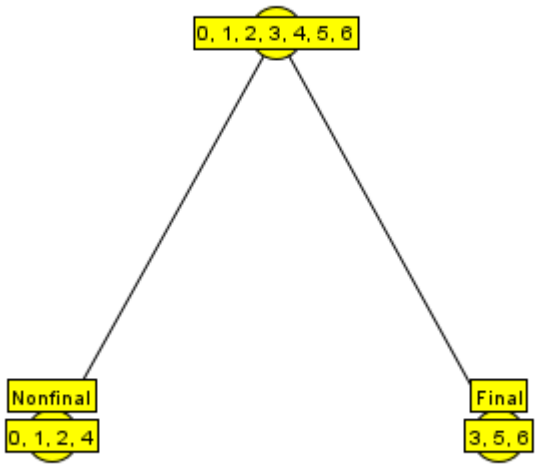
DFA Minimization

Minimize the following DFA


q0
q1
q2
q3
q4
q5
q6
0
1

The DFA minimization is done by clicking the convert menu and then the minimize DFA option.

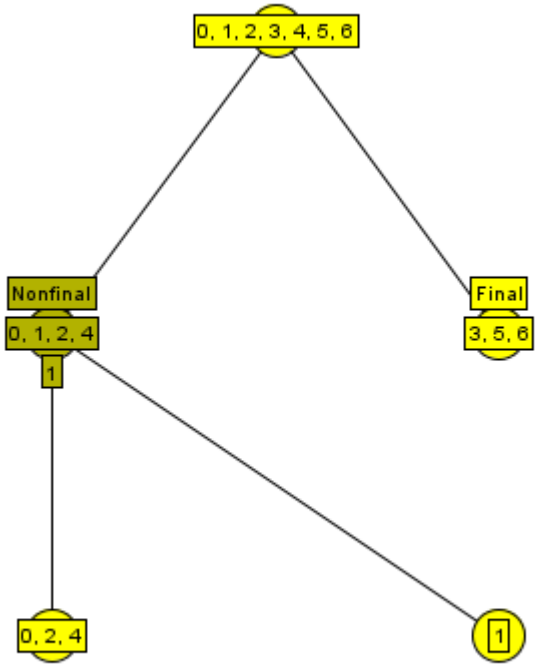
The algorithm being used is one of partitioning, due to Hopcroft. First the states are split into final and non-final states as shown here



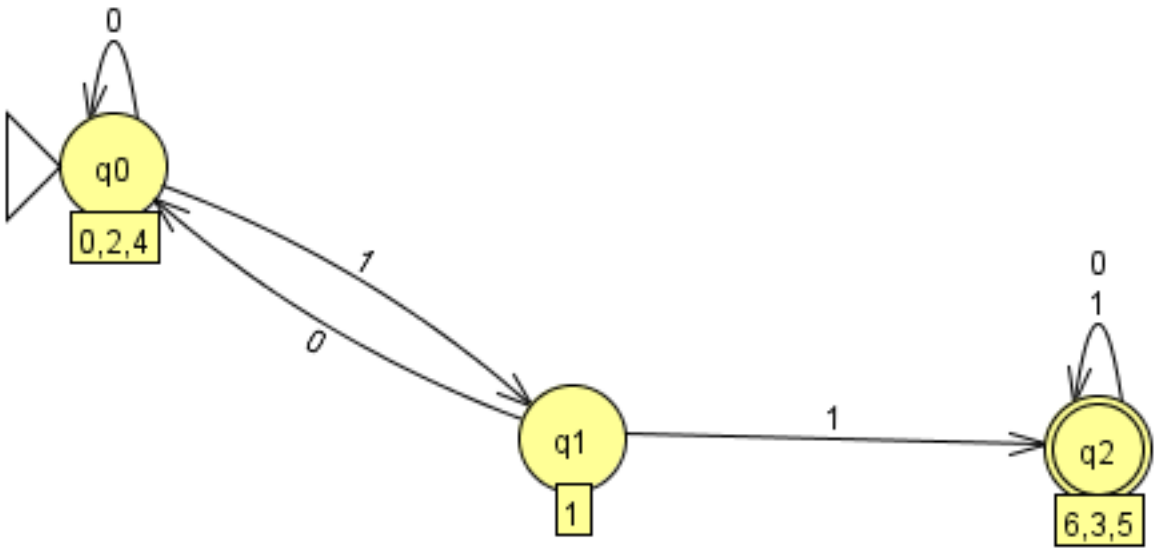
Now to partition the states further we repeatedly choose a set A from the current partition and an input symbol c, and split each of the sets of the partition into two (possibly empty) subsets: the subset of states that lead to A on input symbol c, and the subset of states that do not lead to A.

For instance since $\{0, 1, 2, 4\}$ on an input of 0 goes to $2, 4, 2, 2$ respectively and all of those are in the set, there is no splitting based on the 0 input. However, on an input of 1 we notice these states going to $1, 3, 1, 1$ respectively. So state q_1 is not equivalent to states q_0, q_2, q_4.

For the states q_3, q_5, q_6 it is easy to see that they are all interconnected and therefore will not be split up by this partitioning procedure. So at the end of the day you have 3 equivalence classes $\{q_0, q_2, q_4\}$,$\{q_1\}$ and $\{q_3, q_5, q_6\}$ as seen here



Once the states have been partitioned into equivalence classes, the minimized DFA is produced as follows.


0
q0
0,2,4
1
0
q1
1
1
0
1
q2
6,3,5