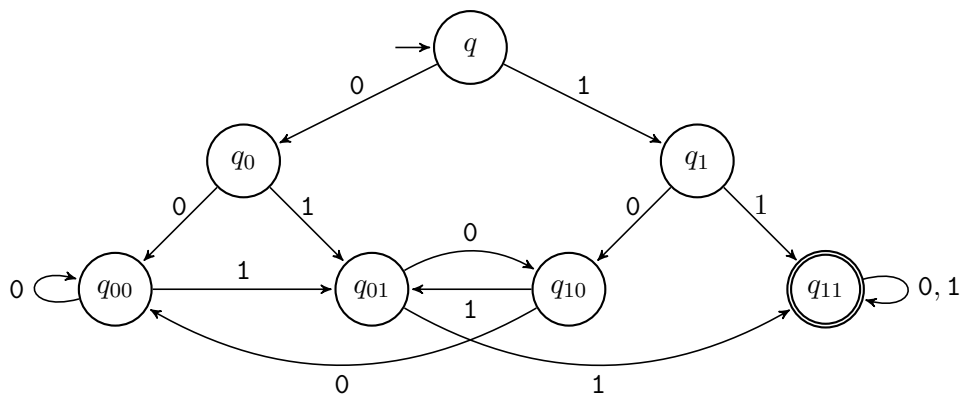


Week 5 Tutorial Session

1. For any integer $k \geq 0$, define $L_k = \{ww \mid w \in \{0,1\}^k\}$.
 - (a) Write down all strings in L_3 .
 - (b) Prove that any DFA for L_k has at least 2^k states.
2. Let L be the set of strings over $\{0,1\}$ whose number of ones is a perfect square (e.g. 0, 1, 4, 9, 16, ...). Prove that L is irregular.
3. This problem concerns the following DFA.



- (a) Run the minimization algorithm on this DFA. Show the table of pairs of distinguishable states at the end of the algorithm. Also draw the minimized DFA.
- (b) Show that every pair of states in the minimized DFA is distinguishable.
- (c) Convert the minimized DFA into a regular expression using the conversion algorithm from class. Show the preprocessing step and how the NFA changes after each state is eliminated.