1) \( \Sigma = \{0, 1, 2, 3, a, b, c\} \)

The NFA above accepts a set of strings of length 7. What is the total number of strings accepted by the NFA? You must come up with a general formula for calculating this number for any \( n \times m \) matrix like the one shown above. Show your working.

2) Find DFA for the following language on \( \Sigma = \{a, b\} \). (Try and do this in as few states as possible)

\( L = \{w: \ (n_a(w) - n_b(w)) \mod 3 > 0\} \)

3) Find DFA for the following language on \( \Sigma = \{a, b\} \).

\( L = \{w: \text{there are at most two runs of a's of length three}\} \)

(A run in a string is a substring of length at least two, as long as possible and consisting entirely of the same symbol. E.g. abbbaab contains a run of b's of length three and a run of a's of length two.)
4) Find DFA for the following language on $\Sigma = \{0, 1\}$.
Every substring of four symbols has at most two 0's. For example, 001110 and 011001 are in the language, but 10010 is not since one of its substrings, 0010, contains three zeros.

5) Construct a DFA that accepts strings on $\{0,1\}$ if and only if the value of the string, interpreted as a binary representation of an integer, is zero modulo seven. For example, 1110, 100011 representing integers 14 and 35, respectively, are to be accepted.