# HW 2.1

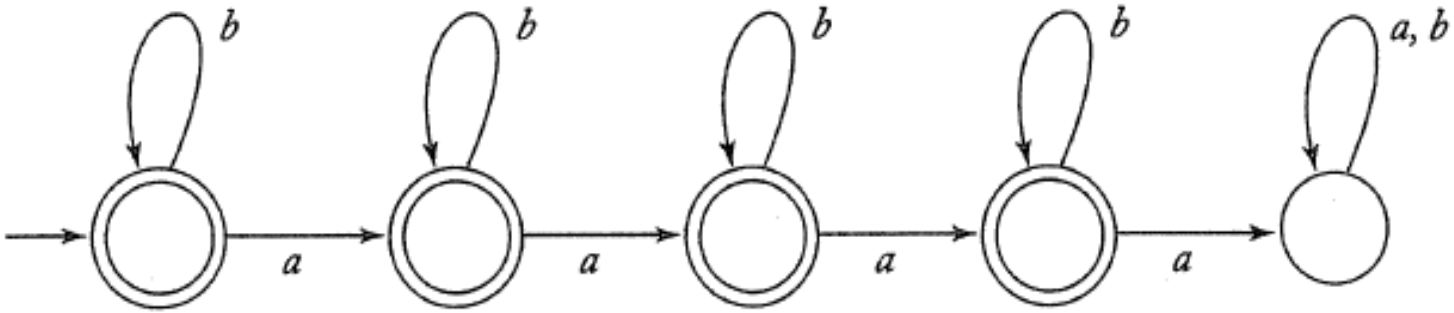
[2] (c) all strings with no more than three $a$'s,

[5] (a) $L = \{ab^5wb^2 : w \in \{a, b\}^*\}$,

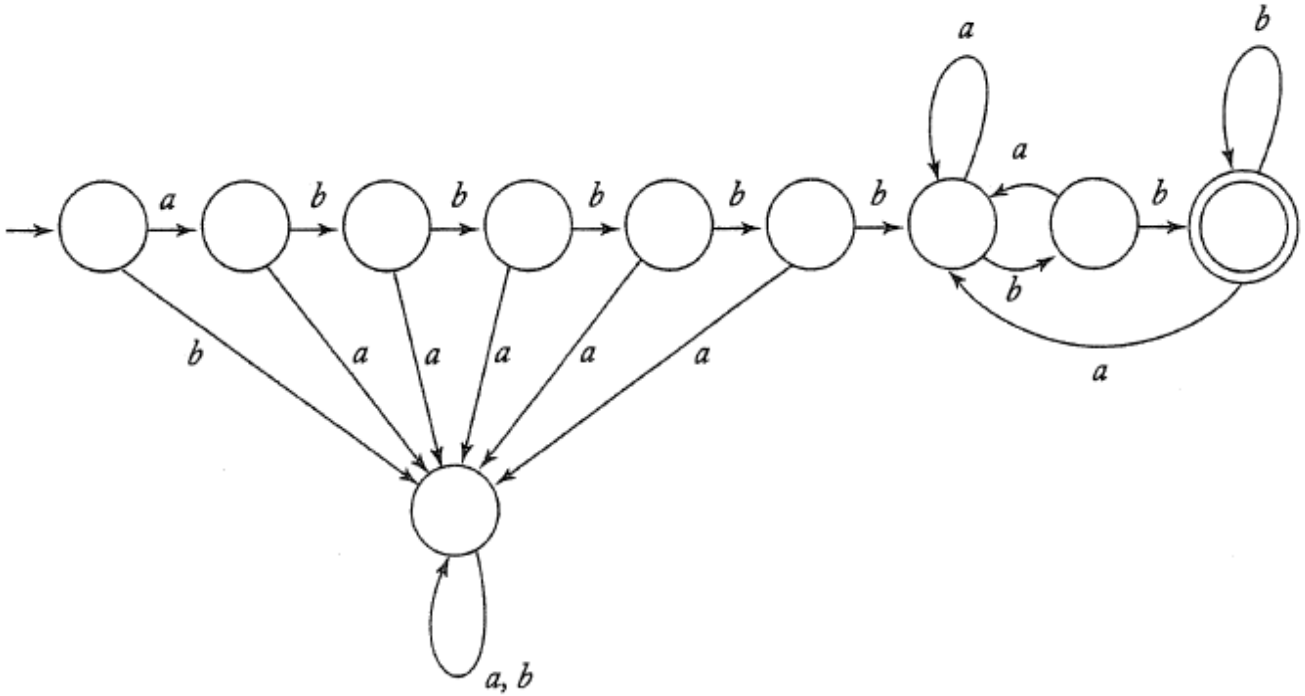
[7] (a) $L = \{w : |w| \mod 3 = 0\}$.

(d) $L = \{w : n_a(w) \mod 3 > n_b(w) \mod 3\}$.

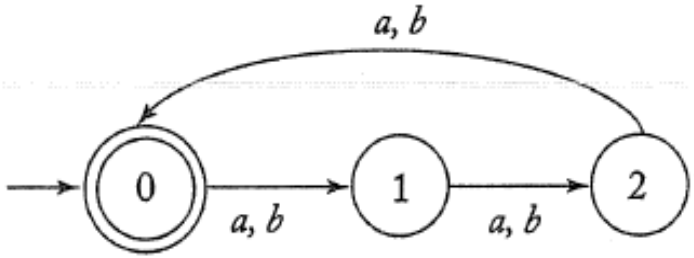
**2.** (c) Break it into three cases each with an accepting state: no $a$'s, one $a$, two $a$'s, three $a$'s. A fourth $a$ will then send the dfa into a non-accepting trap state. A solution:



**5.** (a) The first six symbols are checked. If they are not correct, the string is rejected. If the prefix is correct, we keep track of the last two symbols read, putting the dfa in an accepting state if the suffix is *bb*.



**7.** (a) Use states labeled with $|w| \bmod 3$. The solution then is quite simple.



(d) For this we use nine states, with the first part of each labeled $n_a(w) \bmod 3$, the second part, $n_b(w) \bmod 3$. The transitions and the final states are then simple to figure out.