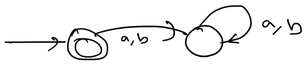
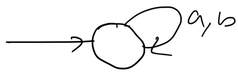
An automaton that only accepts empty string:

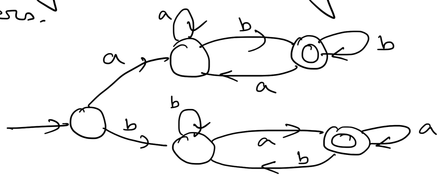


Empty language ?



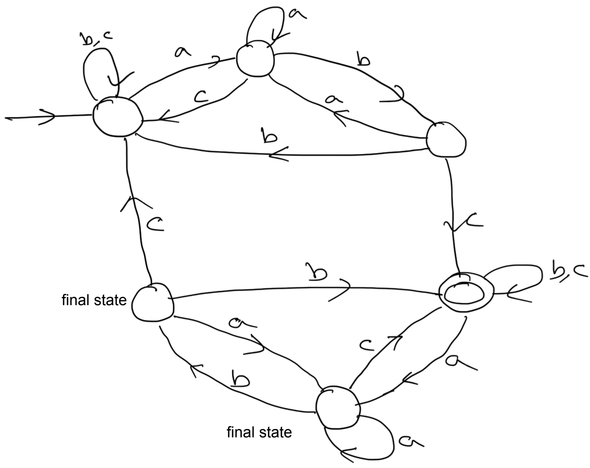
$\Sigma = \{a, b\}$

FA accepting all words having diff first & last letters.



$\Sigma = \{a, b, c\}$

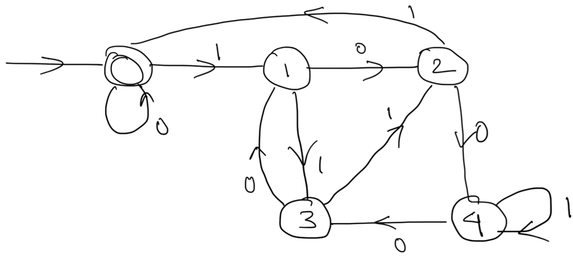
Odd No of occurrences of "abc".



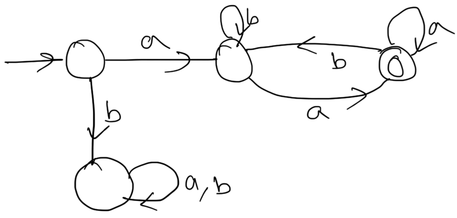
DFA for $x \bmod 5 = 0$

x is a binary string. Following our usual convention, the string is read from left to right. (MSB to LSB).

101 → 0
1101 → 3
1100 → 2
1111 → 0
0100 → 4
1000 → 3
10001 → 2
1010 → 0
1001 → 4
10011 → 4
100111 → 4
10010 → 3



$L = \{awa \mid w \in \{a,b\}^*\}$



* A run in a string is a substring of length at least 2, as long as possible & consisting entirely of the same symbol.

$L = \{w \mid$ there exists at most 2 runs of a's of length three$\}$

$L = \{w \mid$ there are exactly 2 runs of a's of length three$\}$

Truncate $L = \{$ truncate$(w) \mid w \in L\}$

truncate → remove rightmost symbol.

→ Prove regular if L is regular.