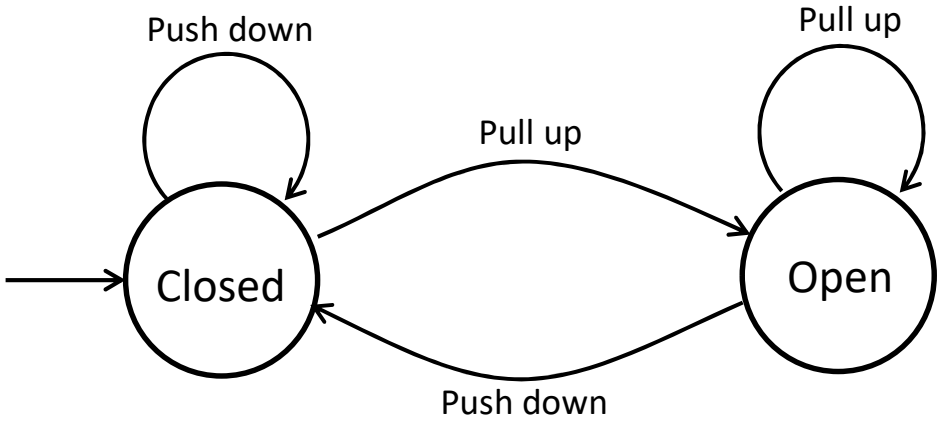
Cornerstones of Computer Science

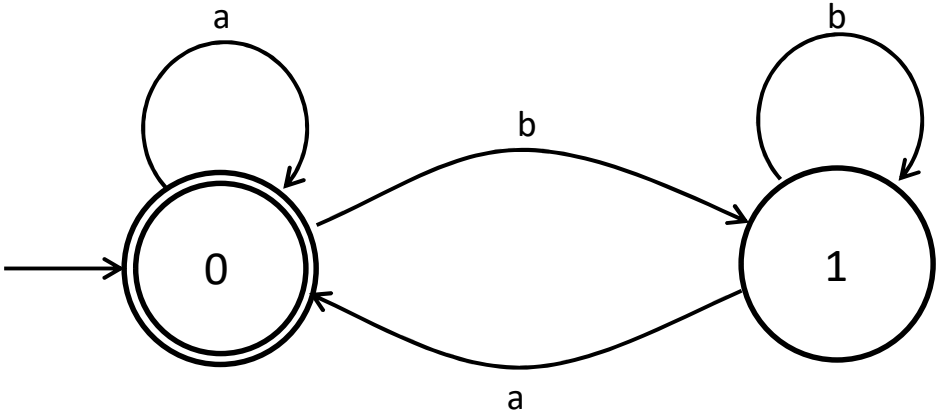
DFSA Exercise State Diagram Solutions

by Richard Born

Exercise 1
Finite State Machine for a House Window



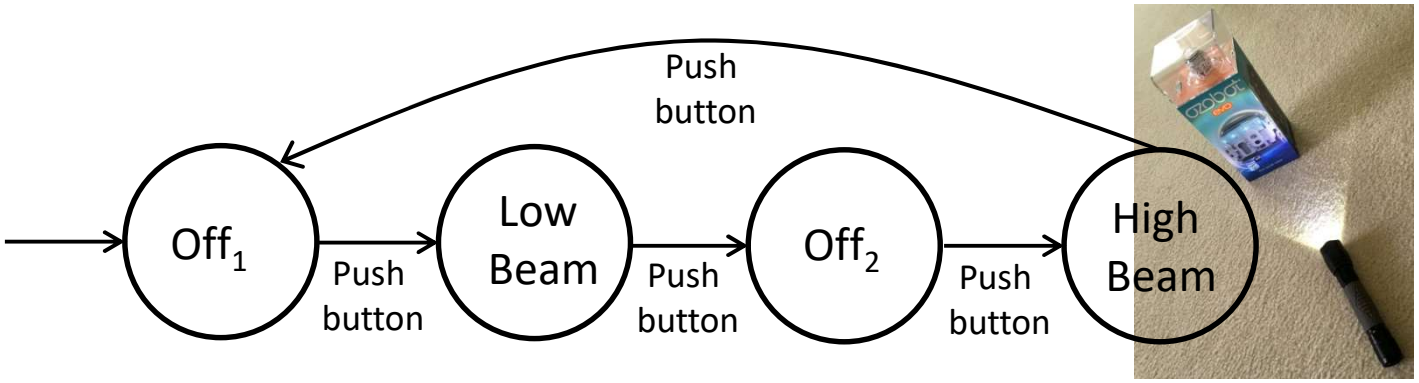
Evo's House Window

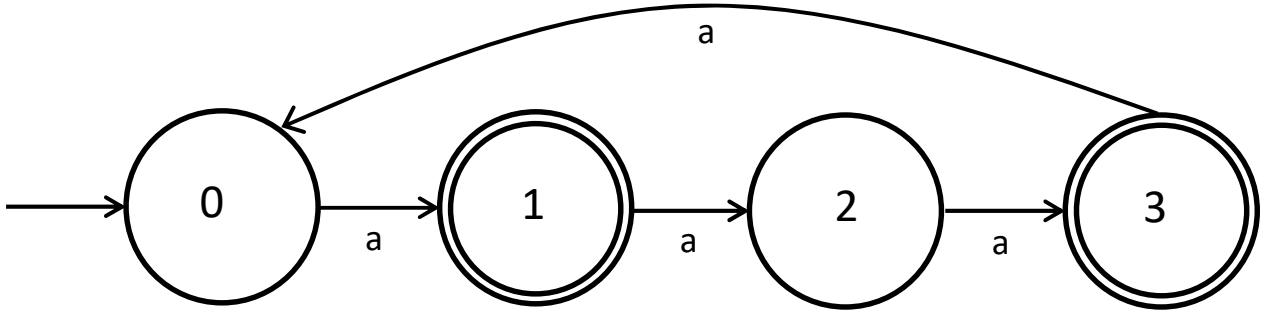


Exercise 2

Finite State Machine for an LED Flashlight with a Single Button

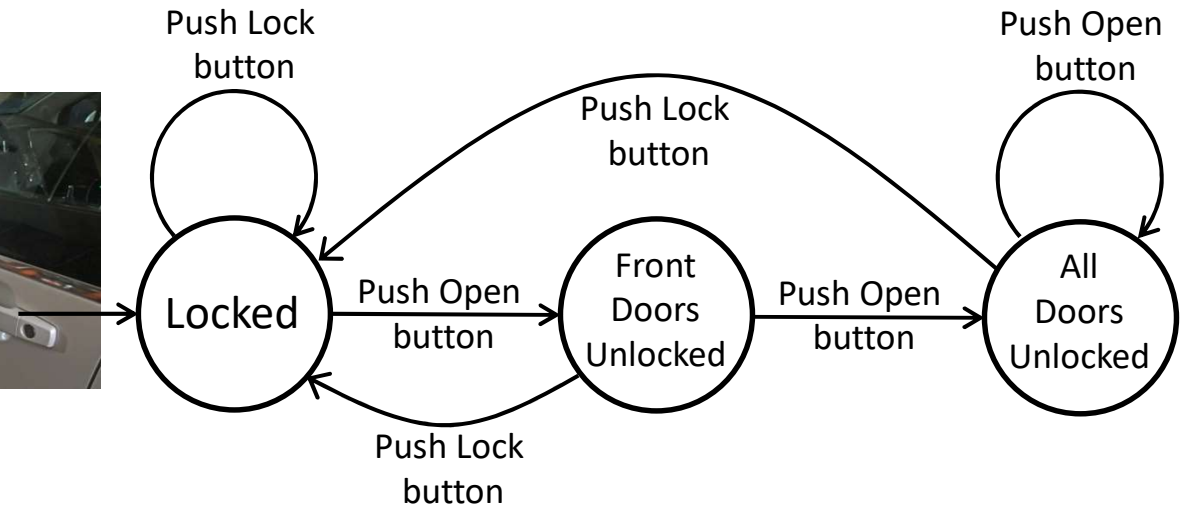
LED Flashlight with a Single Button

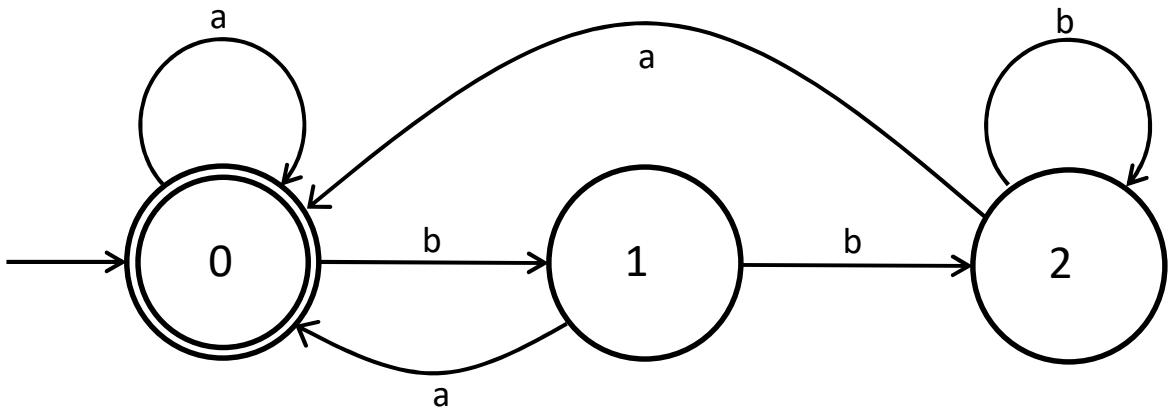




Exercise 3

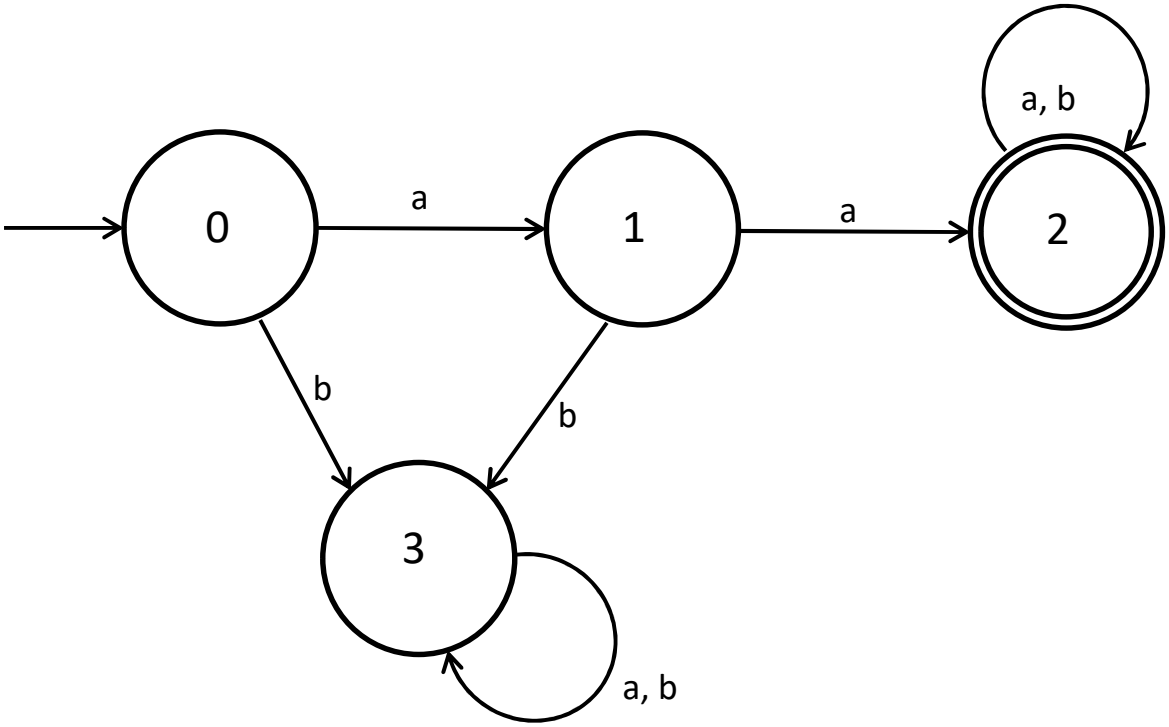
Finite State Machine for a Car Door Remote with Two Buttons





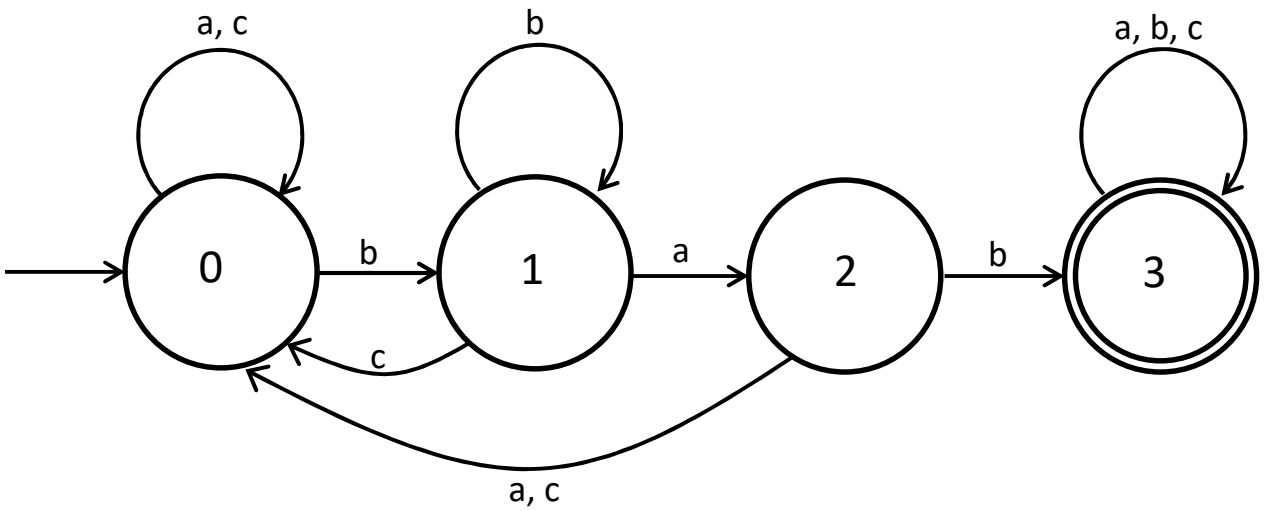
Exercise 4

The language consisting of the set of all strings of a's and b's beginning with aa (and possibly containing no b's)



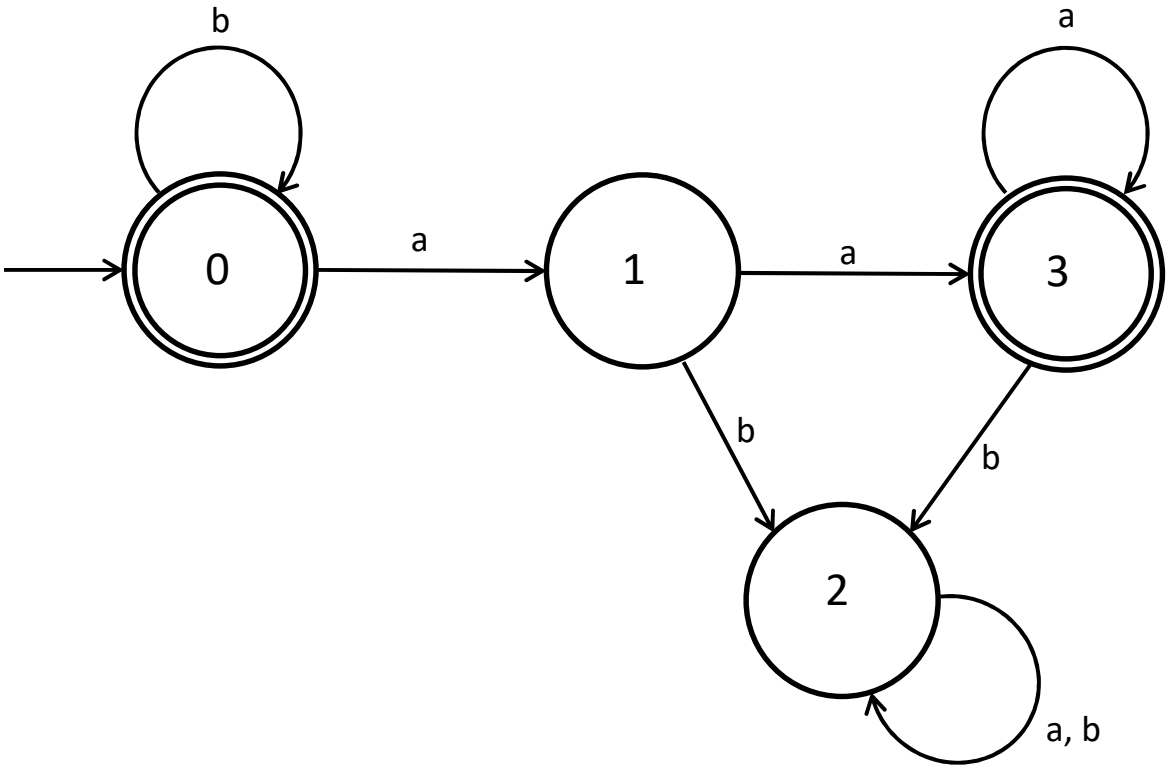
Exercise 5

The language consisting of the set of all strings of a's, b's, and c's containing bab as a substring



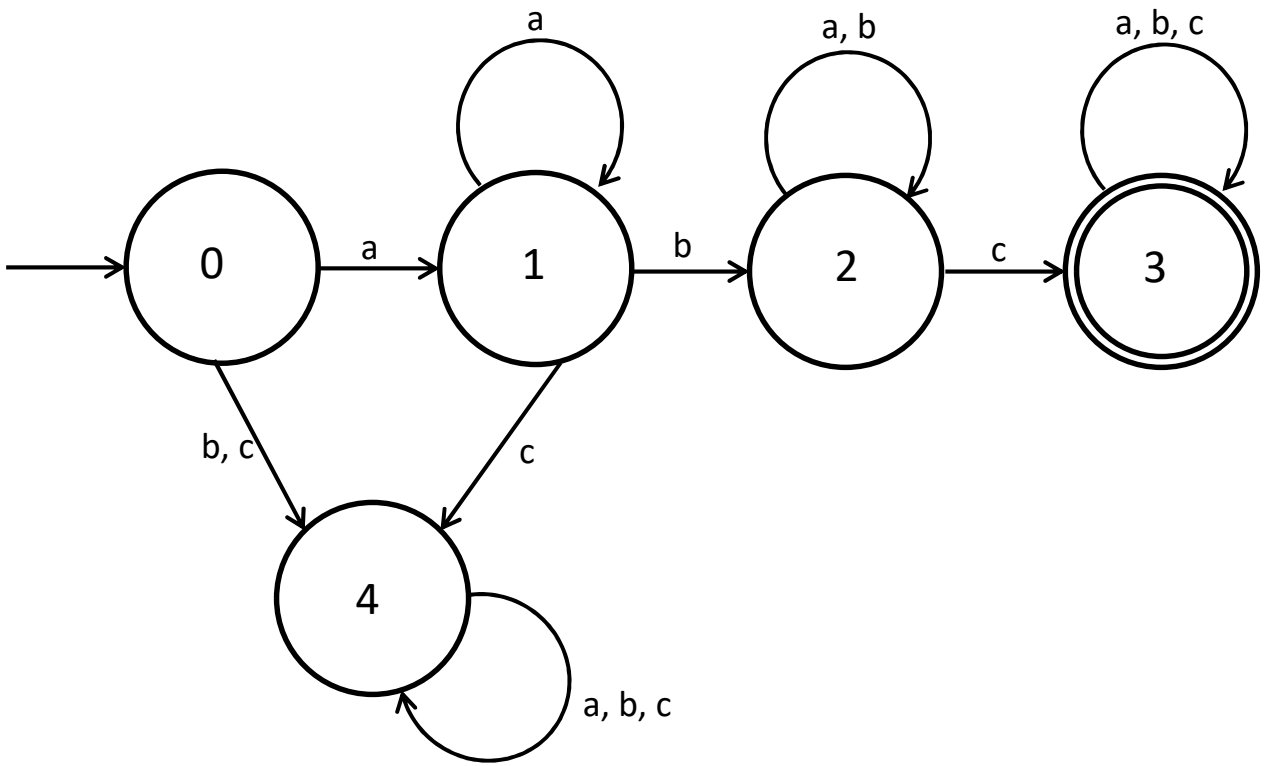
Exercise 6

The language consisting of the set of all strings of the form b* or b*aaa*.



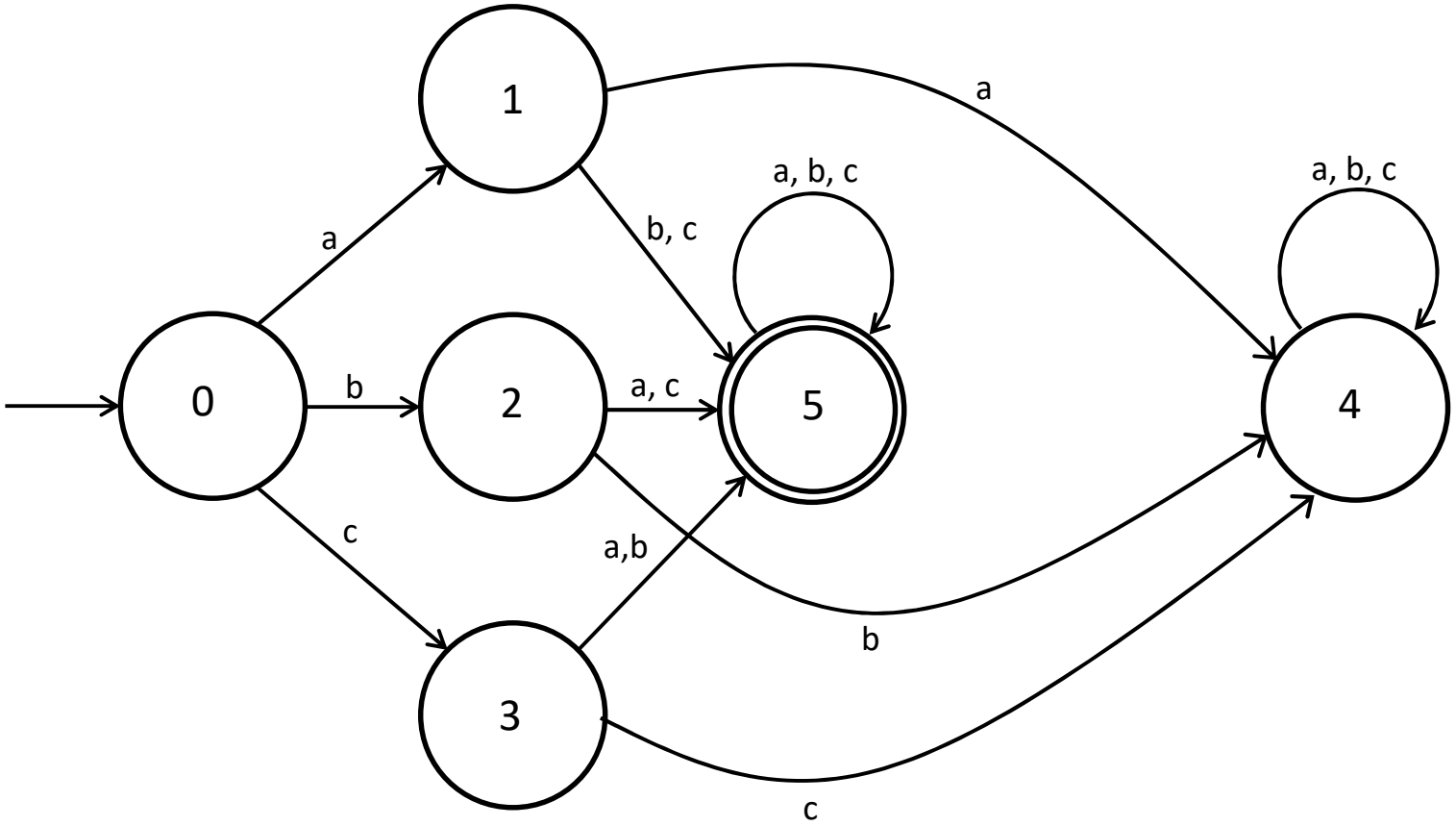
Exercise 7

The language consisting of the set of all strings of a's, b'c, and c's with at least one a, one b, and one c for which the first **a** must precede the first **b**, and the first **b** must precede the first **c**.



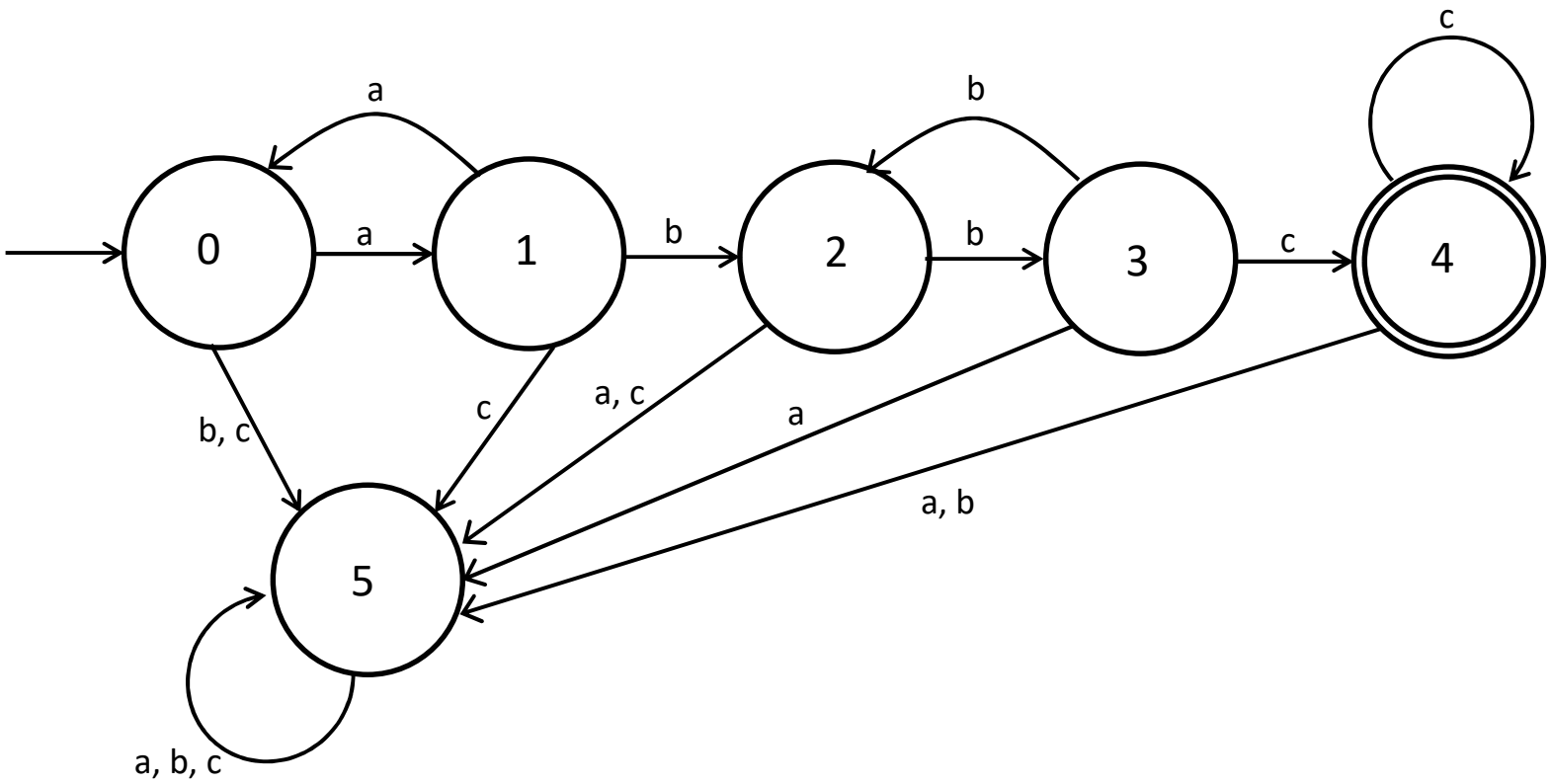
Exercise 8

The language consisting of the set of all strings of a's, b's, and c's of length two or greater for which the first two characters are different



Exercise 9

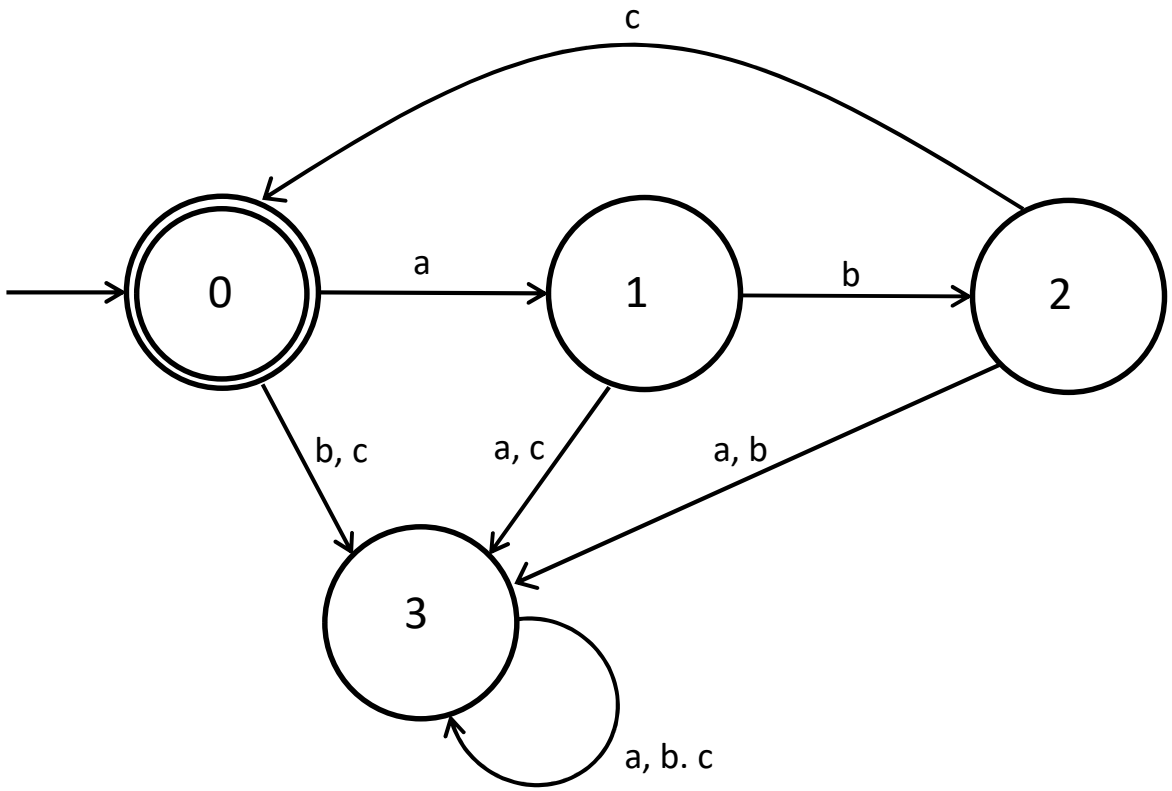
The language consisting of the set of all strings of a's, b's, and c's of the form $a^{2m+1}b^{2(n+1)}c^{p+1}$, where m, n, p ≥ 0.



Exercise 10

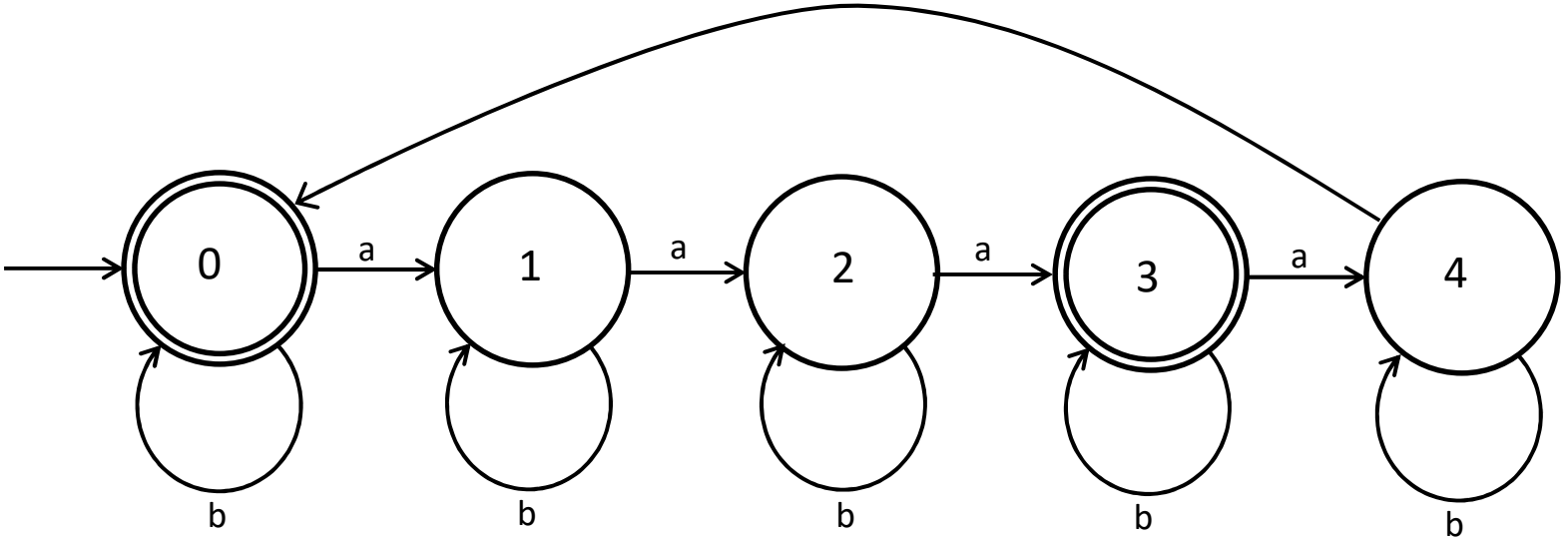
The language consisting of the set of all strings of a's, b's, and c's containing *only* any number, including none, of abc triples.

Regular expression: $(abc)^n$



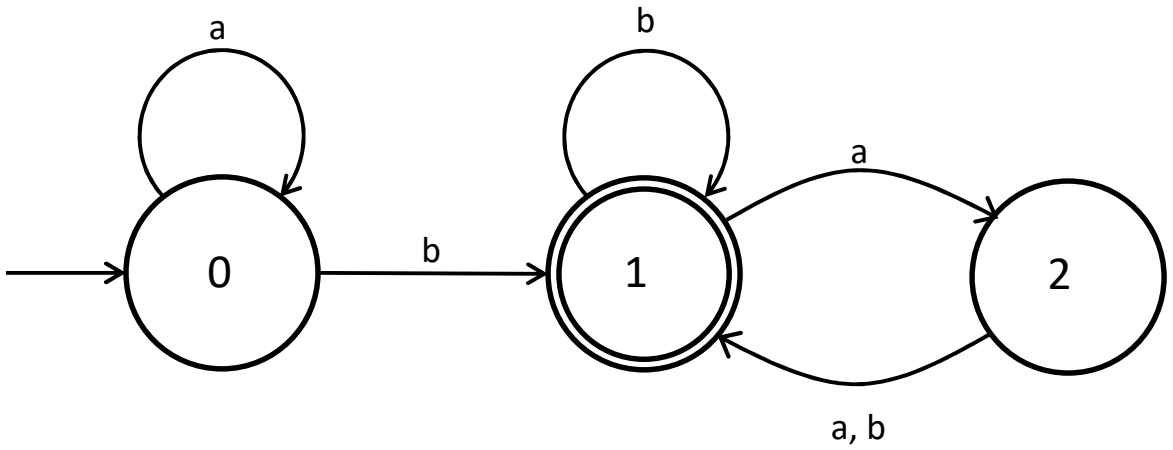
Exercise 11

The language consisting of the set of all strings of a's and b's with the number of a's congruent to 0, mod5, or congruent to 3, mod 5. (In other words, the number of a's can be 0, 5, 10, 15, … or 3, 8, 13, 18, …).



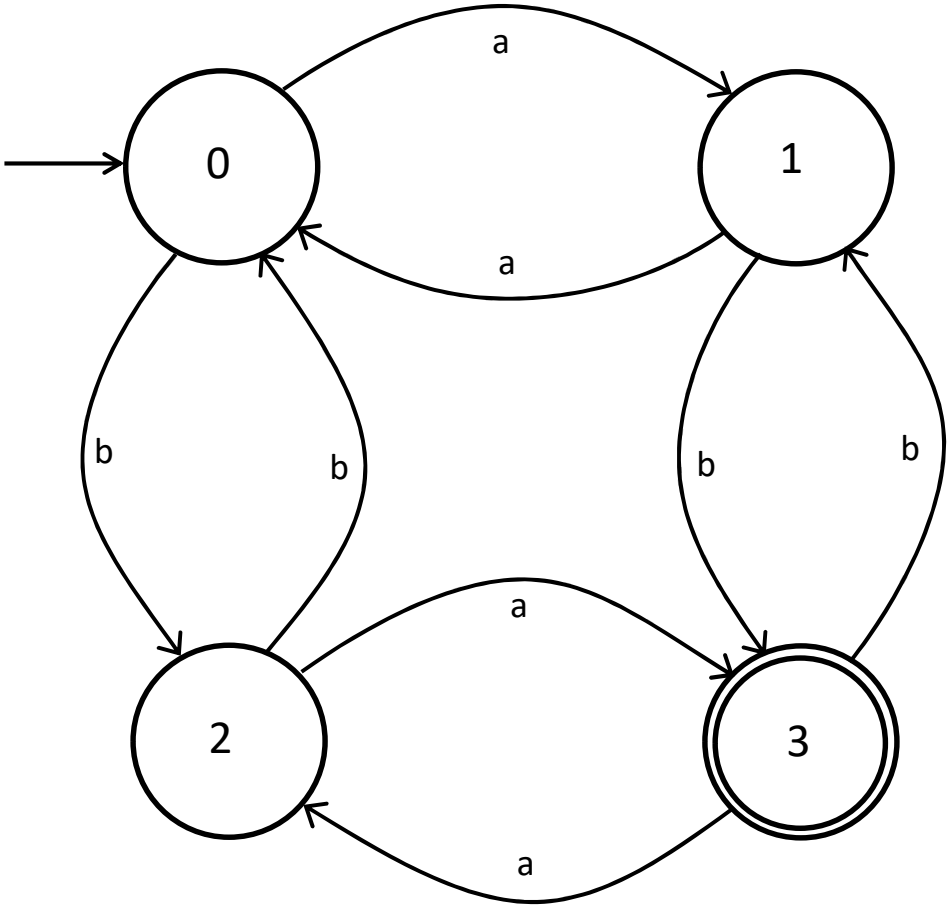
Exercise 12

The language consisting of the set of all strings of a's and b's that have at least one b and an even number of a's after the final b. (Note that 0 is an even number).



Exercise 13

The language consisting of the set of all strings of a's and b's for which the number of a's **and** the number of b's is *odd*. What simple change would you need to make in your state diagram if you wanted the set of all strings of a's and b's for which the number of a's and number of b's is *even*? (Note that 0 is an even number).



To get strings with even a's and even b's, you can simply change the final state from 3 to 0.