

2.1 Write regular expressions for the following character sets, or give reasons why no regular expression can be written:

- (a) All strings of lowercase letters that begin and end in a.
- (c) All strings of digits that contain no leading zeros.
- (d) All strings of digits that represent even numbers.

Solution:

(a)  $a|a[a-z]^*a$

(c)  $[1-9][0-9]^*$

(d)  $[0-9]^*[02468]$

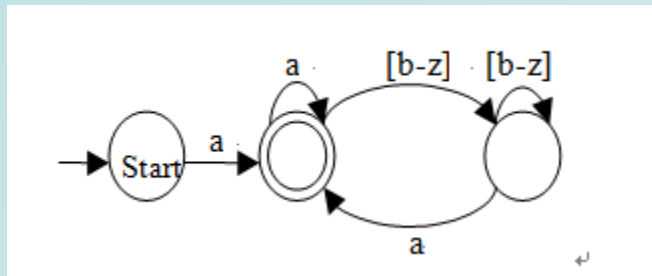


## 2.8

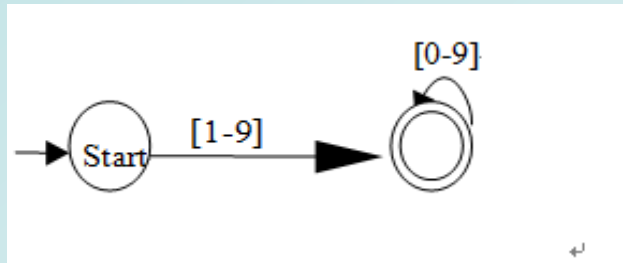
Draw DFAs for each of the sets of characters of (a)-(i) in Exercise 2.1, or state why no DFA exists.

Solution:

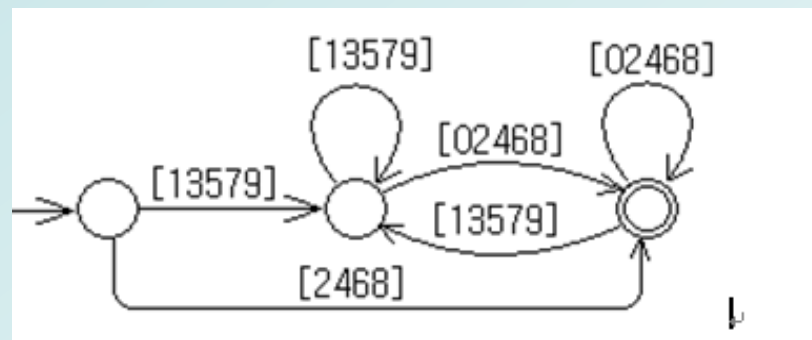
(a)



(c)



(d)

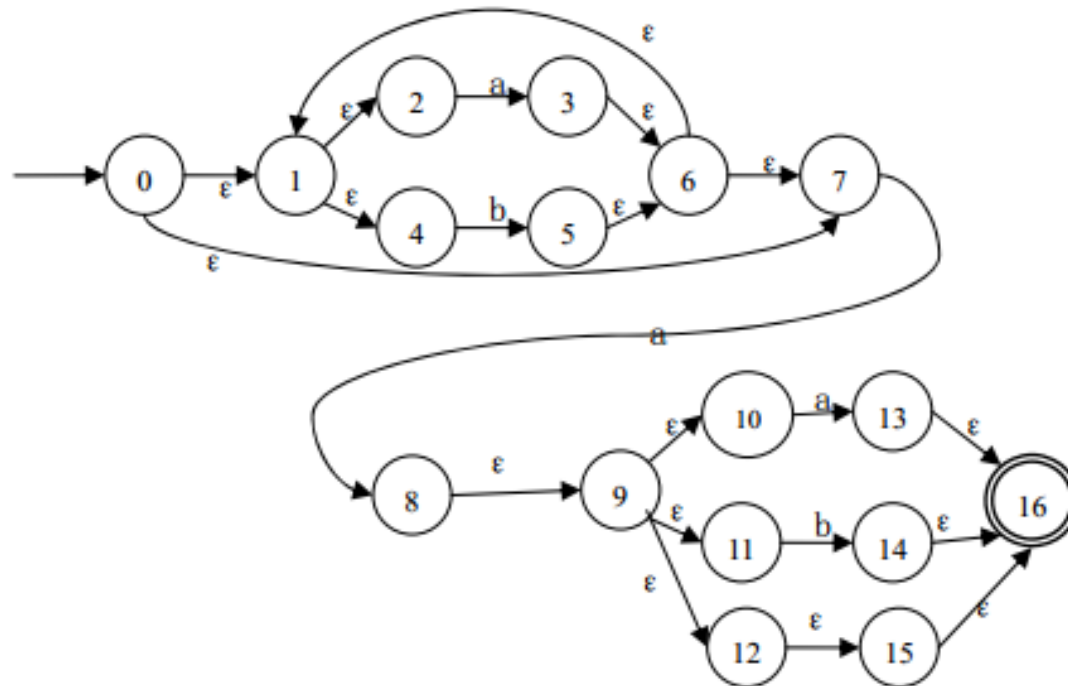


2.12 (a) Use Thompson's construction to convert the regular expression  $(a|b)^*a(a|b|\epsilon)$ .

(b) Convert the NFA of part (a) into a DFA using the subset construction.

Solution:

(a)



(b)

