

Compile Principle - HW of Chapter 2

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2.1 (a, c, d), 2.8 (a, c, d), 2.12

2.1

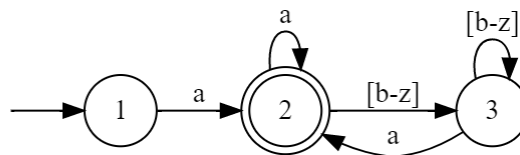
(a) $a|a[a-z]^*a$

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

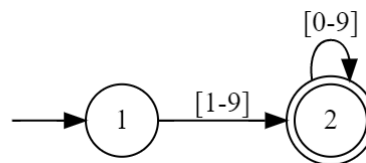
(d) $[02468] | [1-9][0-9]^*[02468]$

2.8

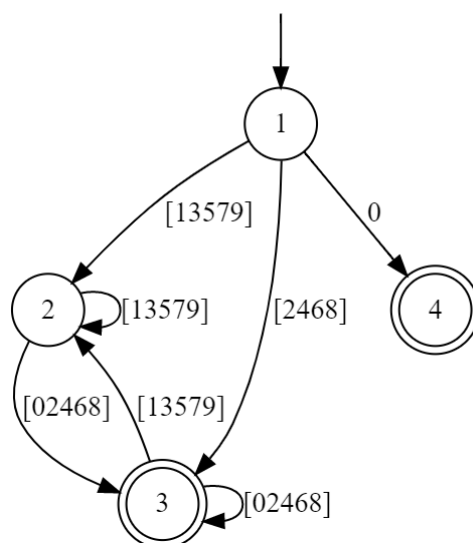
(a)



(c)



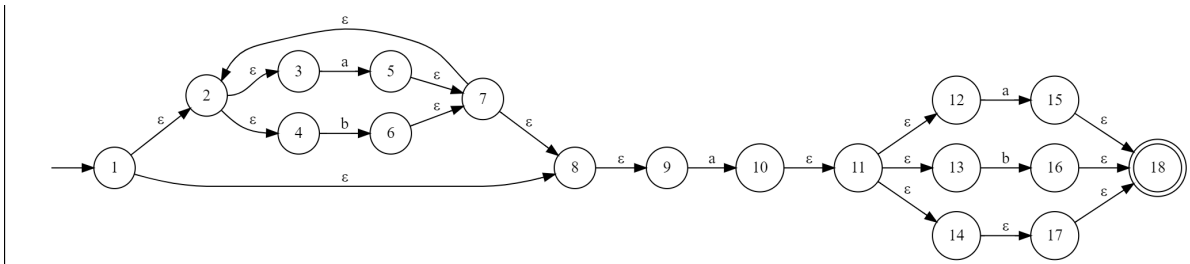
(d)



2.12

$(a|b)^*a(a|b|\epsilon)$

(1)



(2) Start with the state **state[1]** :

$$State[1] = \bar{1} = \{1, 2, 3, 4, 8, 9\}$$

where \bar{x} is the ϵ -closure of state x in the DFA.

When **state[1]** accept **a**, it will reach **state[2]** :

$$State[2] = \overline{\{5, 10\}} = \bar{5} \cup \bar{10} = \{2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 17, 18\}$$

When **state[1]** accept **b**, it will reach **state[3]** :

$$State[3] = \bar{6} = \{2, 3, 4, 6, 7, 8, 9\}$$

When **state[2]** accept **a**, it will reach **state[4]** :

$$State[4] = \overline{\{5, 10, 15\}} = \bar{5} \cup \bar{10} \cup \bar{15} = \{2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18\}$$

When **state[2]** accept **b**, it will reach **state[5]** :

$$State[5] = \overline{\{6, 16\}} = \bar{6} \cup \bar{16} = \{2, 3, 4, 6, 7, 8, 9, 16, 18\}$$

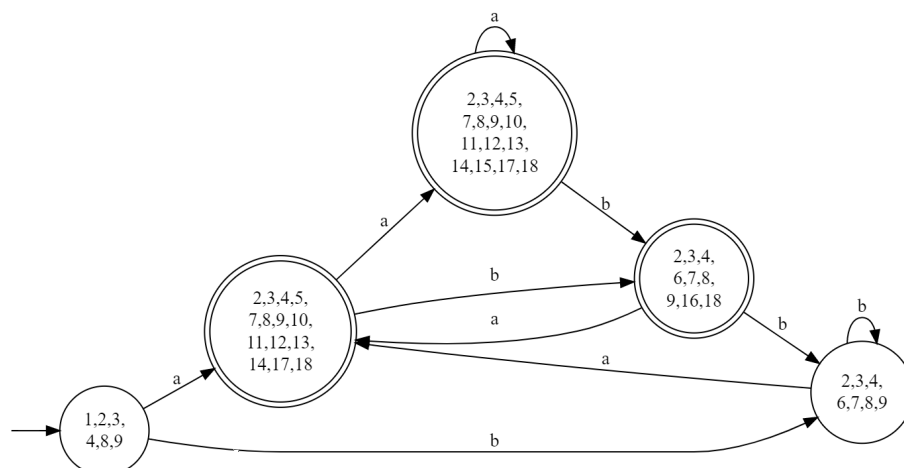
When **state[3]** accept **a**, it'll reach **state[2]** ; when accept **b**, it'll reach **state[3]** .

When **state[4]** accept **a**, it'll reach **state[4]** ; when accept **b**, it'll reach **state[5]** .

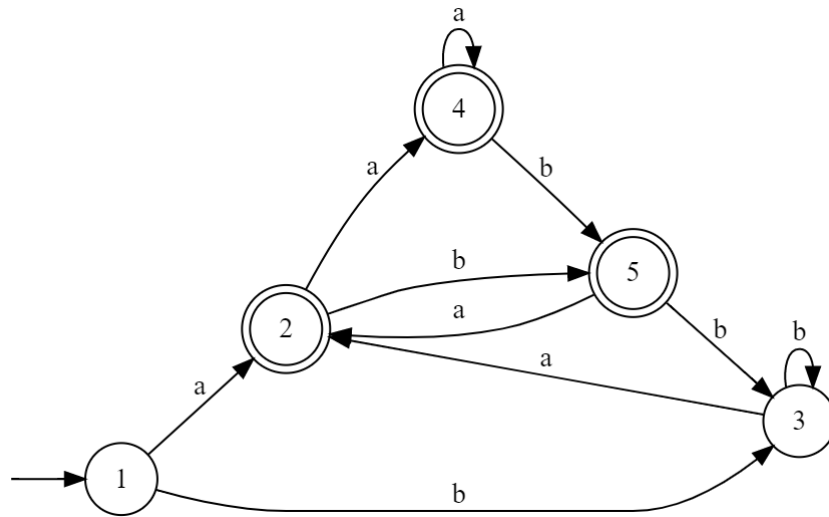
When **state[5]** accept **a**, it'll reach **state[2]** ; when accept **b**, it'll reach **state[3]** .

As **state[2, 4, 5]** contains the final state **18** in the NFA, so they are final states in DFA.

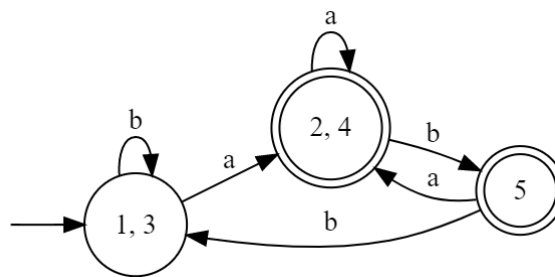
So here we've got the DFA:



And we just denote the sets of states by number 1~5:



We can finally simplify the DFA above to be the following one:



i.e.

