

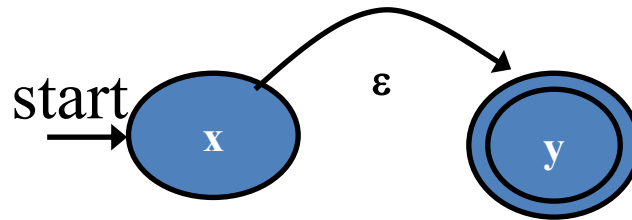
# Lexical Analysis

- **[20 pts.]** Construct minimum-state DFA for the following regular expression:  $(ab)^*(a|b)$ :
  1. Convert the regular express into NFA first. **[6 pts.]**
  2. Convert the NFA into DFA by subset construction. The Transition table is required. **[8 pts.]**
  3. Minimize the state of DFA. **[6 pts.]**

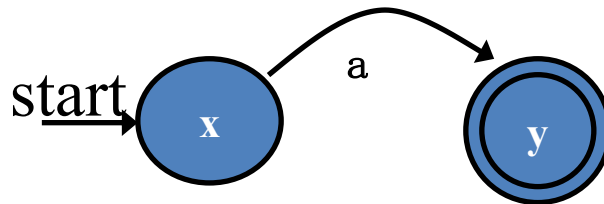


# Construct NFA for each basic regular expression

1. NFA for  $\varepsilon$

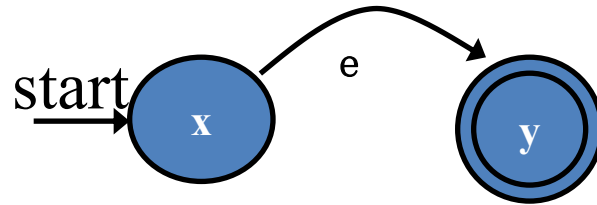


2. NFA for single character **a**

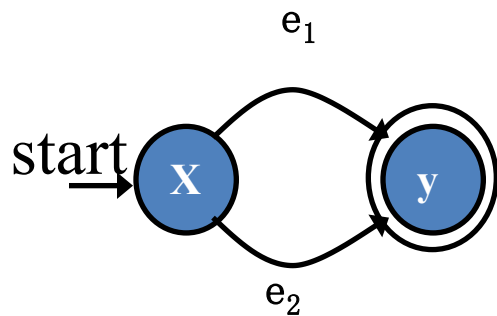


# Construct NFA for complex regular expressions

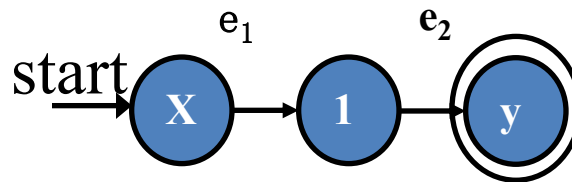
(1) The NFA for regular expression “e” is



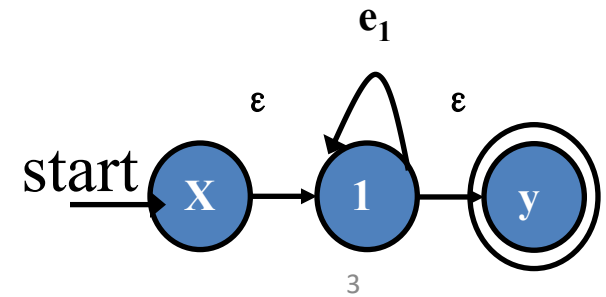
(2) Break up the NFA basing on the following three operations until the arrowed line is labeled by only characters



$$e = e_1 | e_2$$



$$e = e_1 e_2$$

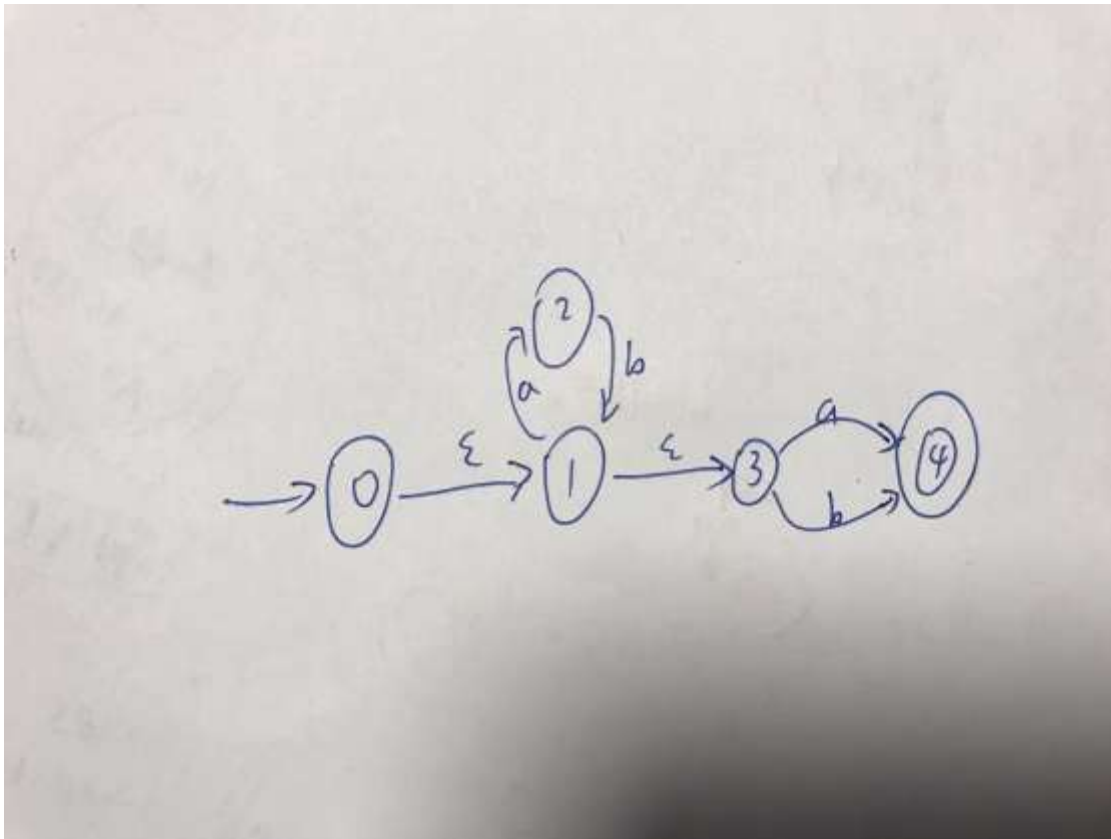


$$e = e_1^*$$



# Lexical Analysis

- 1 Convert the regular express into NFA

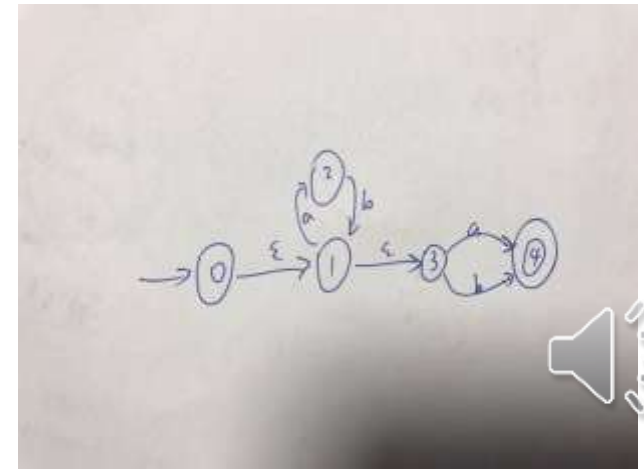
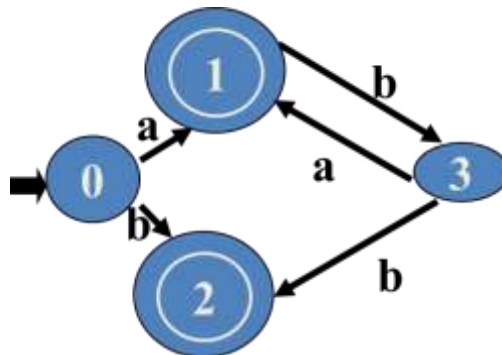


# Lexical Analysis

- 2 Transition table:

I	Ia	Ib	Accept
{0,1,3} T0	{2,4} T1	{4} T2	no
{2,4} T1		{1,3} T3	yes
{4} T2			yes
{1,3} T3	{2,4} T1	{4} T2	no

- DFA:



# Lexical Analysis

- 3 minimal DFA

- $\{0, 3\} \{1\} \{2\}$

- 0 and 3 are equivalent states, merge them into a state  $\{0,3\}$  of the minimal DFA.

