

CS480

Translators

Finishing Lex Analysis

Chap. 3

Quiz #3

- **Tokenize** the following C statement:

```
float limitedSquare(x) float x; {  
    /*returns x-squared, but never more than 100*/  
    return (x<=-10.0 || x>=10.0)?100:x*x;  
}
```

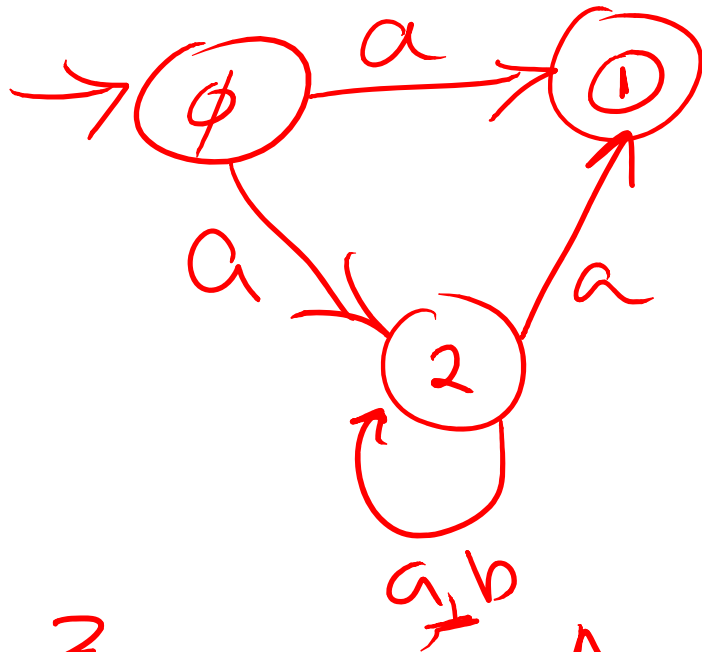
- Given $\Sigma = \{a,b\}$, provide regular expressions for languages below:

- all strings beginning and ending in a
- all strings of a 's and b 's of even length
- all strings with an odd number of a 's
- string of zero or more a 's followed by same number of b 's

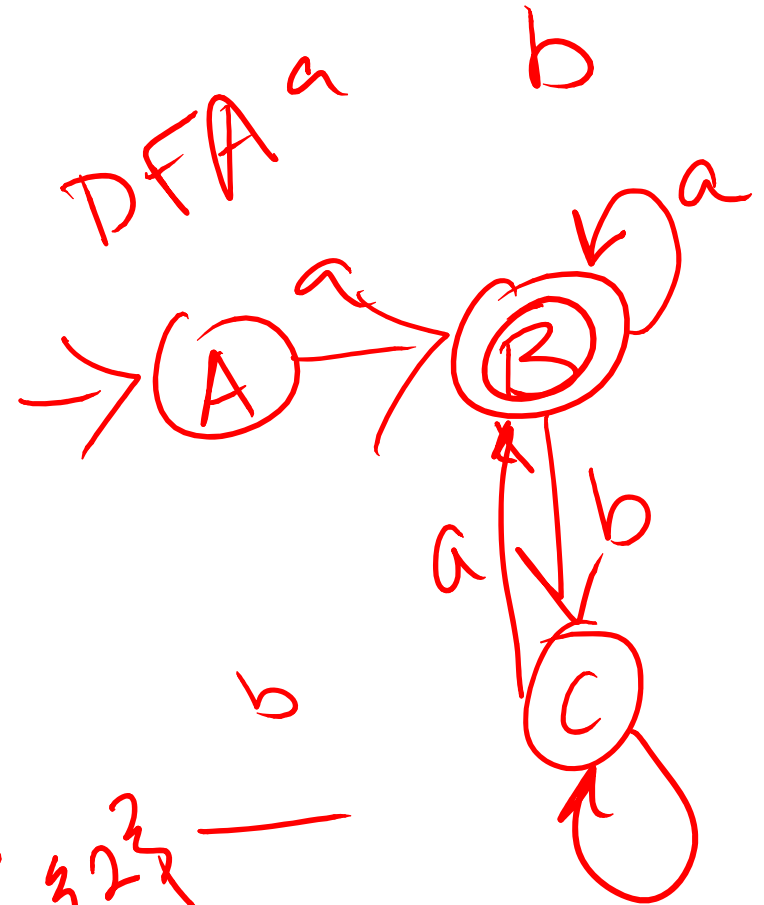
- Give the FSA for each (DFA or NFA)...

$a \mid a(b \mid a)^* a$

NFA



DFA



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

$\{1, 2\}$
 $\{1, 2\}$
 $\{2\}$
 $\{2\}$

NFA to DFA

OPERATION	DESCRIPTION
$\epsilon\text{-closure}(s)$	Set of NFA states reachable from NFA state s on ϵ -transitions alone.
$\epsilon\text{-closure}(T)$	Set of NFA states reachable from some NFA state s in set T on ϵ -transitions alone; $= \cup_{s \text{ in } T} \epsilon\text{-closure}(s)$.
$\text{move}(T, a)$	Set of NFA states to which there is a transition on input symbol a from some state s in T .

```

while ( there is an unmarked state  $T$  in  $Dstates$  ) {
    mark  $T$ ;
    for ( each input symbol  $a$  ) {
         $U = \epsilon\text{-closure}(\text{move}(T, a))$ ;
        if (  $U$  is not in  $Dstates$  )
            add  $U$  as an unmarked state to  $Dstates$ ;
         $Dtran[T, a] = U$ ;
    }
}

```

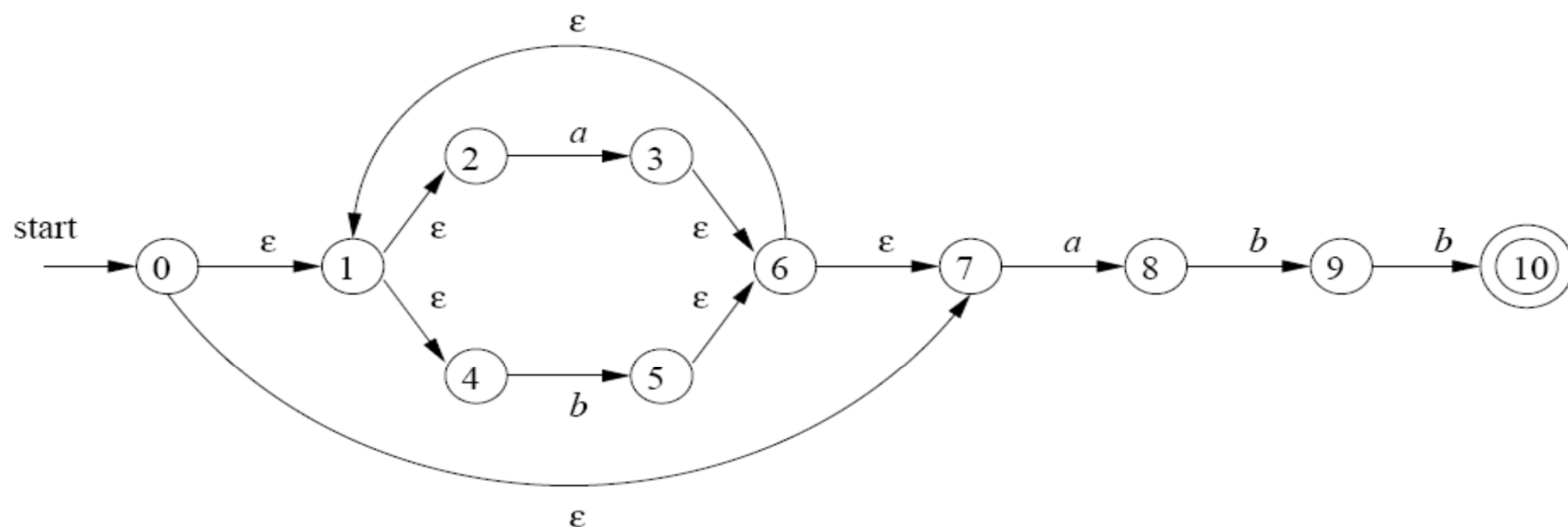


Figure 3.34: NFA N for $(a|b)^*abb$

NFA STATE	DFA STATE	a	b
$\{0, 1, 2, 4, 7\}$	A	B	C
$\{1, 2, 3, 4, 6, 7, 8\}$	B	B	D
$\{1, 2, 4, 5, 6, 7\}$	C	B	C
$\{1, 2, 4, 5, 6, 7, 9\}$	D	B	E
$\{1, 2, 4, 5, 6, 7, 10\}$	E	B	C

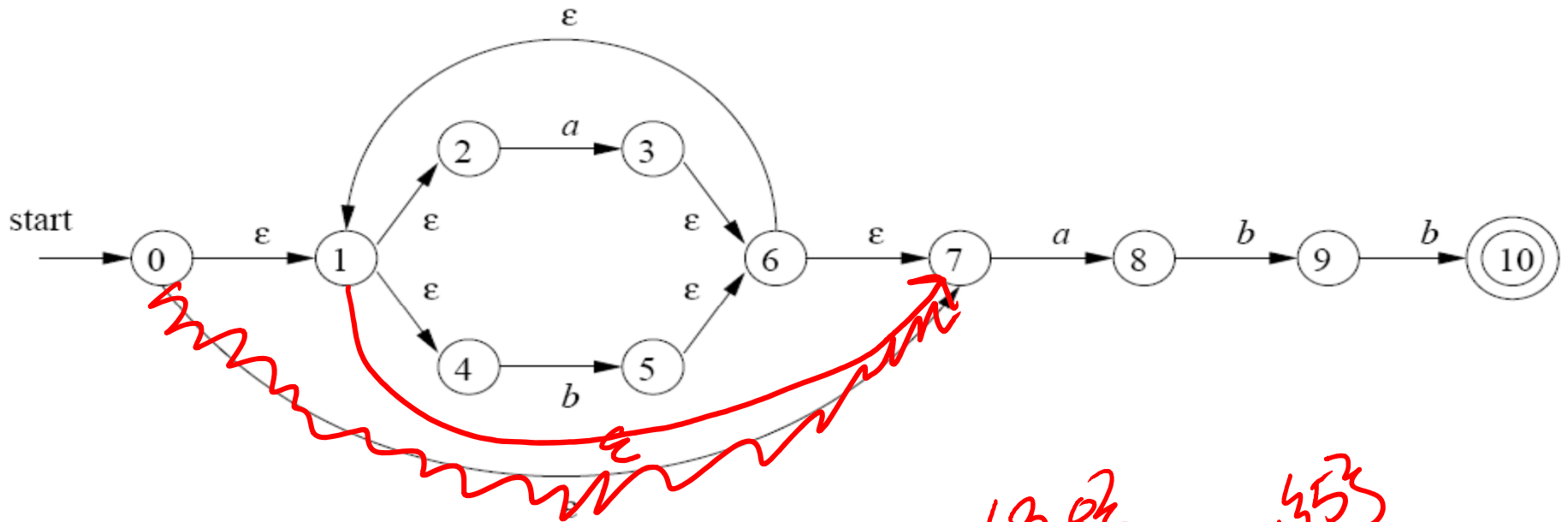


Figure 3.34: NFA N for $(a|b)^*abb$

NFA

$\{0, 1, 2, 4, 7\}$

$\{3, 0, 6, 7, 1, 2, 4\}$

$\{5, 6, 1, 2, 4, 7\}$

$\{9, 5, 6, 1, 2, 4, 7\}$

$\{10, 5, 6, 1, 2, 4, 7\}$

DFA

A

B

C

D

E

B

B

B

B

B

C

D

C

E

C

DFA - $(a|b)^*abb$

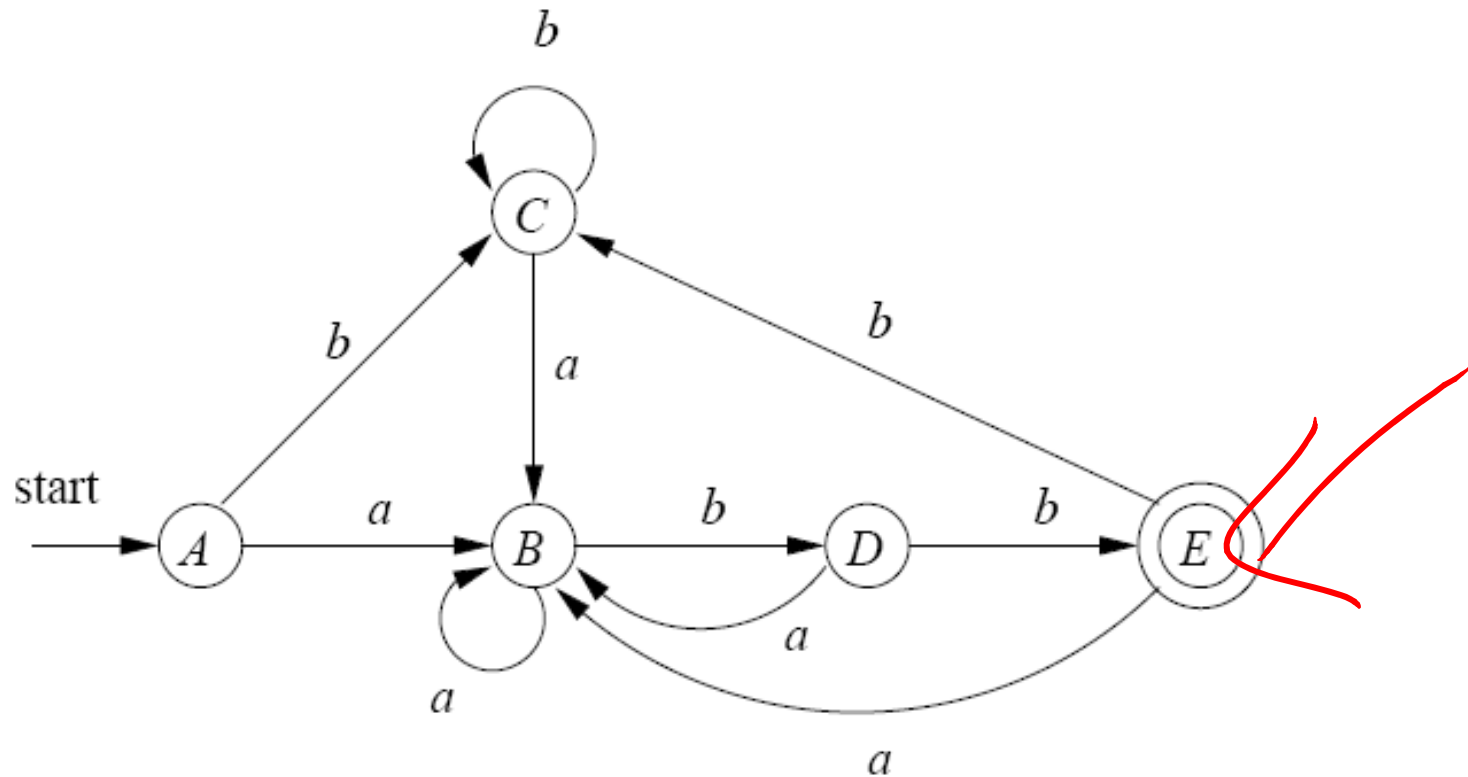


Figure 3.36: Result of applying the subset construction to Fig. 3.34

NFA w/ ϵ -transitions (Make a DFA)

- $(aa^* | bb^*)$

