

④ (c) First NFA

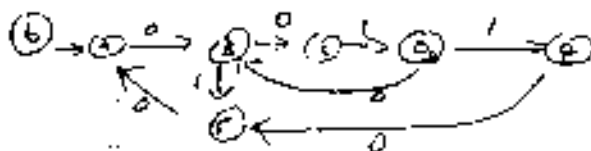


Then grammar from each arc:

- $A \rightarrow 0B$
- $A \rightarrow 1B$
- $B \rightarrow 0C$
- $B \rightarrow 1C$
- $C \rightarrow 0D$  ✗
- $D \rightarrow 1D$  ✗

\* No partial final state:

- $C \rightarrow 0$
- $D \rightarrow 1$



- $A \rightarrow 0B$
- $B \rightarrow 0C$
- $C \rightarrow 1D$  ✗
- $D \rightarrow 1E$  ✗
- $D \rightarrow 0B$
- $E \rightarrow 0D$
- $E \rightarrow 1A$
- $B \rightarrow 1E$

- ✗  $C \rightarrow 1$
- ✗  $D \rightarrow 1$

⑤ (c) must be true

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- (1) Not LL(1) - must be true.
- (2) Language not LL(1) - might be false (example in class)
- (3) Ambiguous - false. example in class.

(b) may be true

- (1) parse all strings - maybe.
- (2) parse some strings - maybe. [1+2 example in class]
- (3) parse no strings - maybe.

⑥ (c) If  $A \rightarrow A\alpha$  then there must also be  $A \rightarrow \beta$ .  
So can generate  $\beta\alpha, \beta\alpha\alpha, \dots$   
So consider grammar:

- $A \rightarrow \beta X$
- $X \rightarrow \alpha X$
- $X \rightarrow \alpha$

So trade left recursion to right recursion.

⑦ (c)



(a) Simple phrases are leaf productions - parse, or dotted reduction or  $abbb\ abbb\ abbb$  underlined terminals.

(b) Handle is leftmost simple phrase or  $a \neq b$  in string  $a\ b\ b\ abbb\ abbb$

(c)  $S \rightarrow aXS \Rightarrow a^2XS \Rightarrow abbbS \Rightarrow abbbabbb$   
 $\Rightarrow abbbabbbS \Rightarrow abbbabbbabbbS \Rightarrow abbbabbbabbbabbbS$   
 $\Rightarrow abbbabbbabbbabbbabbbS \Rightarrow abbbabbbabbbabbbabbbabbbS$

⑧ (c) A good question that nobody answered.

Answer is YES - S is regular.

Turn in answer as homework on Tuesday, March 29.