

DAY 10

David Papp.

1. a)

a	b	b XOR a	a XOR (b XOR a)
F	F	F	F
F	T	T	T
T	F	T	F
T	T	F	T

b) XOR

3.  $E \rightarrow EK$

$K \rightarrow +E$

$T \rightarrow TM$

$M \rightarrow \times T$

$T \rightarrow (E$

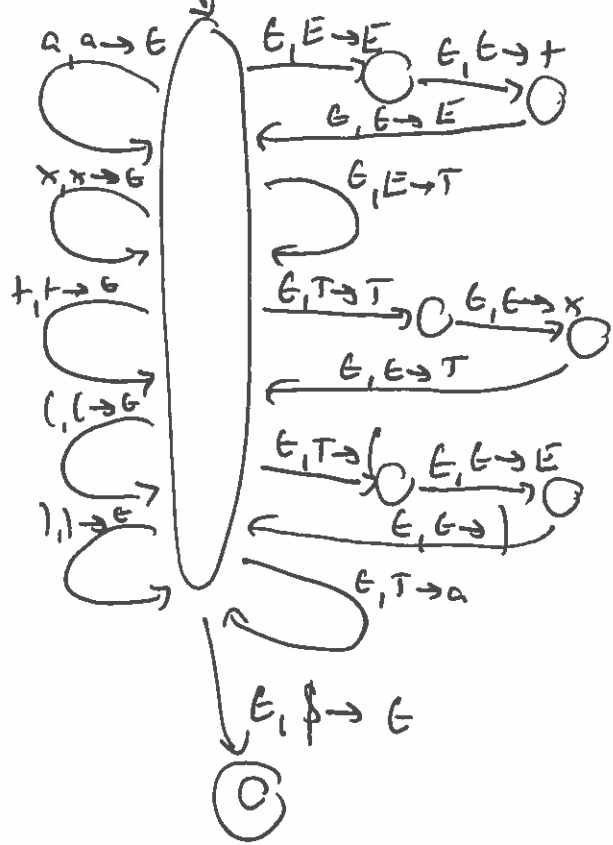
$E \rightarrow E)$

$E \rightarrow TE$

$T \rightarrow a$

2.

$\rightarrow \circ \quad E, E \rightarrow \$$



4. No.

Let  $p$  be the pumping length for this language.

Let  $s$  be the string

$$s = (a^p)^p = w y^i z$$

"a" cannot be in the loop ( $y^i$ ) b/c it must occur exactly once,  
so "a" is either  $w$  or  $z$ . However, the loop ( $y^i$ ) only exists on one  
side of the "a", so it's impossible to have repeating parenthesis on  
both sides.

5. b)

Let  $p$  be the pumping length for this language.

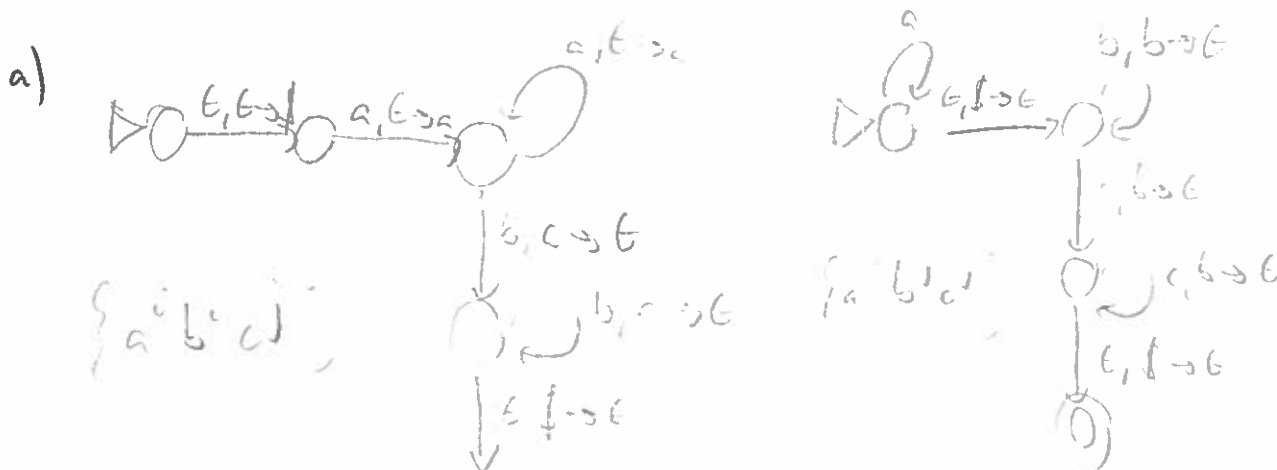
Let  $s$  be the string

$$s = a^{p+1} b^{p+1} c^{p+1}$$

By the pumping lemma, we can rewrite  $s$  as  $uv^iwx^i y$  if  $L$  is regular.

If  $v$  or  $x$  contains a mix of letters, it wouldn't work for  $uv^2wx^2y$ .

If  $v$  or  $x$  only contain a single letter each, the third letter would be  
left out in  $uv^2wx^2y$ .

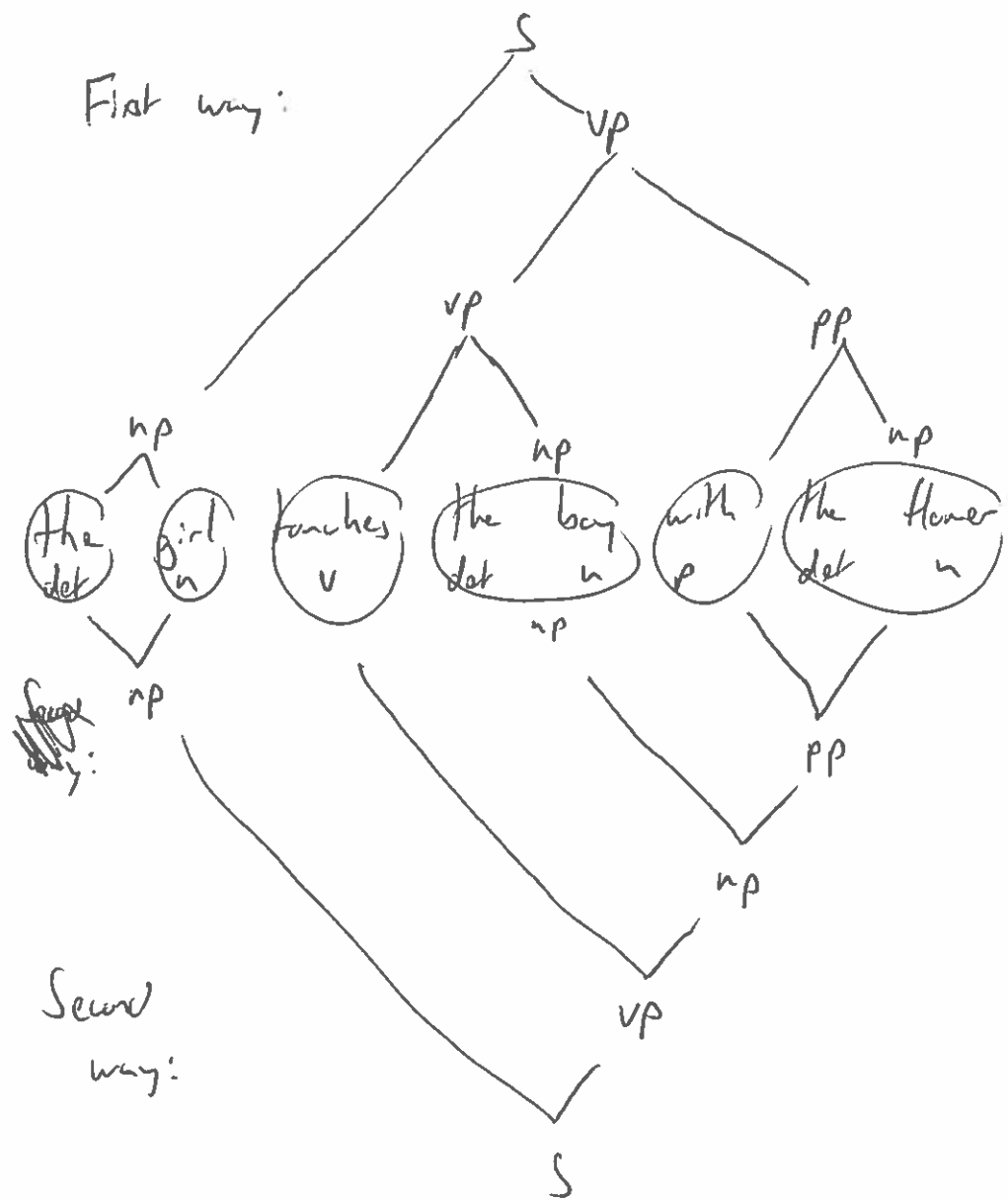


Since  $i=1$

$\{a^n b^n c^n\} \cup \{a^n b^n c^n\} = \{a^n b^n c^n\}$   
Not Regular

6. c)

First way:

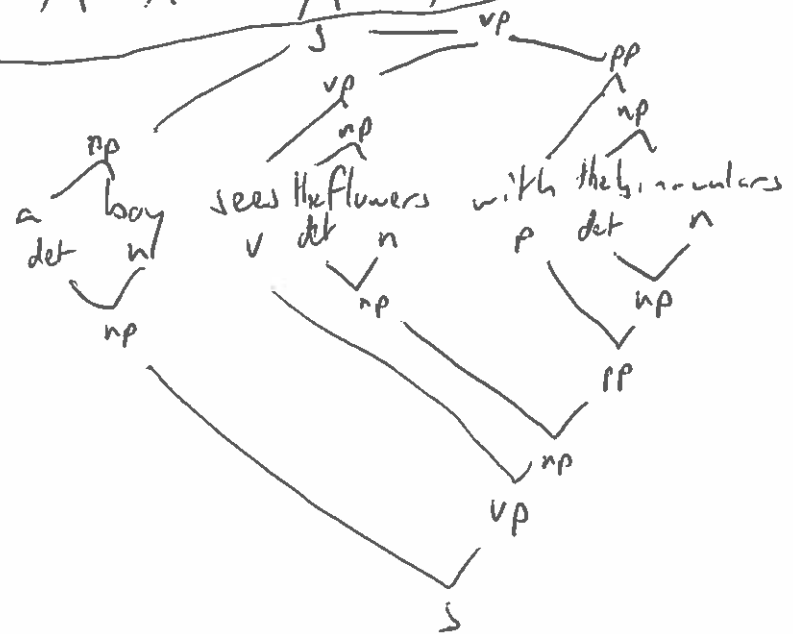


Second way:

b)



c)



d)  $N \rightarrow AD \ N$

$AD \rightarrow \text{tall} \mid \text{purple}$