

1. a) $a \text{ XOR } (b \text{ XOR } a)$

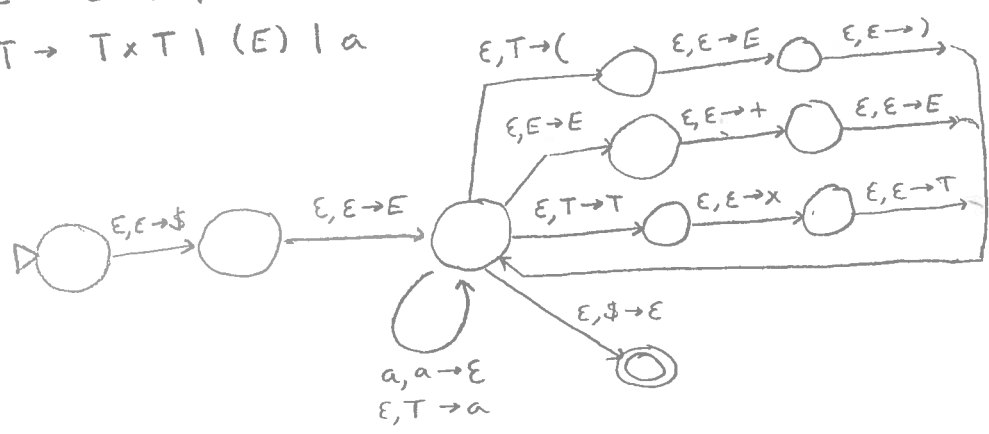
a	b	(b XOR a)
F	F	F
F	T	T
T	F	T
T	T	F

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

(XOR undoes itself)

b) AND? Honestly, this depends on "you can't have any pudding"
vs. "meat \Rightarrow can eat pudding," so it could also be NAND

2. $E \rightarrow E + E \mid T$
 $T \rightarrow T \times T \mid (E) \mid a$



3. $E_0 \rightarrow E + E \mid T$
 $E \rightarrow E + E \mid T$
 $T \rightarrow T \times T \mid (E) \mid a$

$E_0 \rightarrow E + E \mid T \times T \mid (E) \mid a$
 $E \rightarrow E + E \mid T \times T \mid (E) \mid a$
 $T \rightarrow T \times T \mid (E) \mid a$

$E_0 \rightarrow AE \mid MT \mid (E) \mid a$
 $E \rightarrow AE \mid MT \mid (E) \mid a$
 $T \rightarrow MT \mid (E) \mid a$
 $A \rightarrow EP$
 $M \rightarrow TX$
 $P \rightarrow +$
 $X \rightarrow \times$

$E_0 \rightarrow AE \mid MT \mid OC \mid a$
 $E \rightarrow AE \mid MT \mid OC \mid a$
 $T \rightarrow MT \mid OC \mid a$
 $A \rightarrow EP$
 $M \rightarrow TX$
 $O \rightarrow YE$
 $C \rightarrow)$
 $P \rightarrow +$
 $X \rightarrow \times$
 $Y \rightarrow ($

4. $E \rightarrow E + E \mid T$
 $T \rightarrow T \times T \mid (E) \mid a$

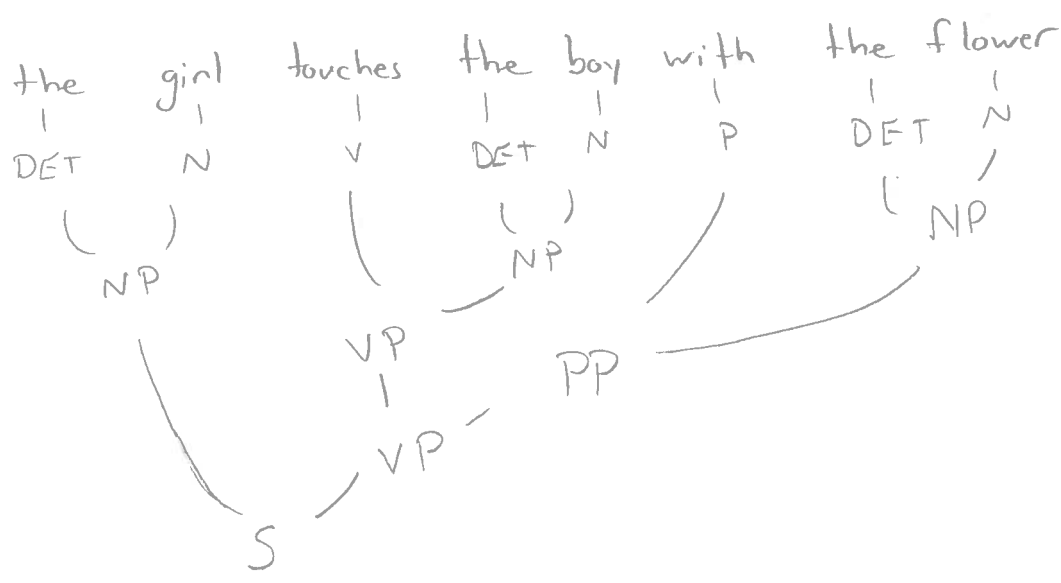
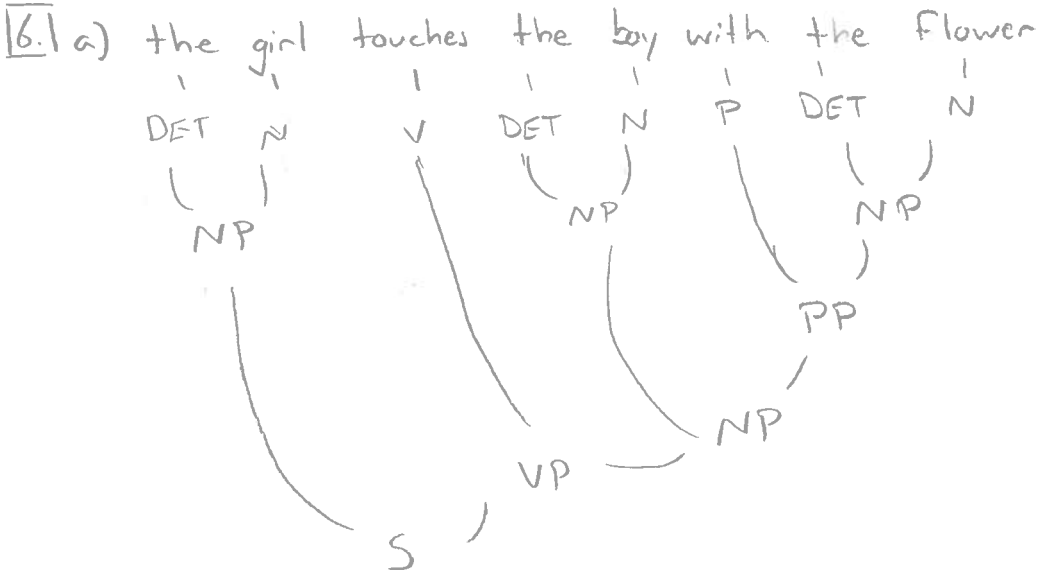
Consider the trivial string $a \in G$.

There is no way to pump a such that $xy^iz \in G$ given $y := a$.

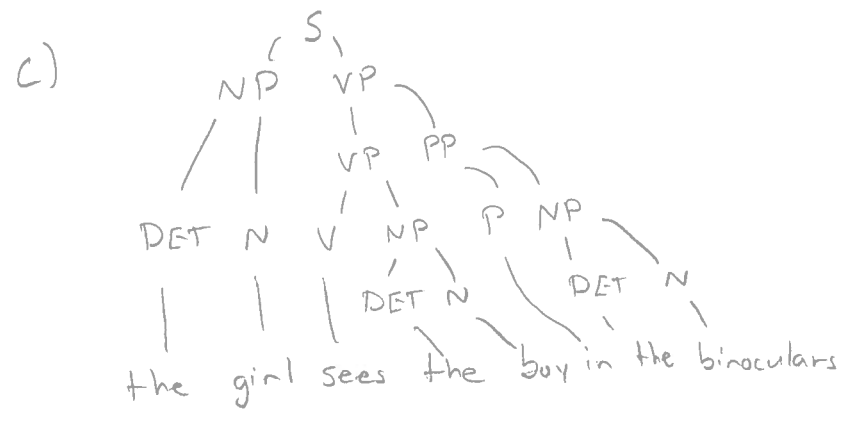
$\therefore G$ is irregular. (er, nonregular)

(I literally mean the string $a: \begin{matrix} E \\ \vdots \\ a \end{matrix}$, not "some string a ".)

5.



b) The girl could be touching a boy while the boy has a flower, or the girl could be using the flower to touch the boy.



6. d) add to G:

$N \rightarrow AN$

$A \rightarrow \text{tall} / \text{purple}$