CS 302
REMOTE QUIZ 8

6 May, 2021

ANSWERS

(a) (3 pts) See the relevant slides

(b) (i) (4 pts) $S \rightarrow a\,X\,S \mid b\,Y\,S \mid e$; $X \rightarrow a\,XX \mid b$; $Y \rightarrow b\,YY \mid a$; *transforms into*

$S \rightarrow A\,X\,S \mid B\,Y\,S \mid AX \mid BY$; $X \rightarrow A\,XX \mid b$; $Y \rightarrow B\,YY \mid a$; $A \rightarrow a$; $B \rightarrow b$

$S \rightarrow CS \mid DS \mid AX \mid BY$; $X \rightarrow CX \mid b$; $Y \rightarrow DY \mid a$; $C \rightarrow AX$; $D \rightarrow BY$, $A \rightarrow a$; $B \rightarrow b$

Hence the CNF grammar G' has the productions above with the new variables

A,B,C and D.

(ii) (3 pts) Rightmost derivation of abab is $S \Rightarrow CS \Rightarrow CAX \Rightarrow CAb \Rightarrow Cab \Rightarrow AXab \Rightarrow$

$Abab \Rightarrow abab$. $L_{G'} = (w \in \{a,b\}^* \mid \#\,a\text{'s} = \#b\text{'s in } w)$