20 April, 2020

CS 302
QUIZ 7 (REMOTE)

ANSWERS

L_1 is a CFL generated by $G = (\{S,A,B\}, \{a,b,c,d\}, R, S)$

where R is given by :

$S \rightarrow AB \; ; \; A \rightarrow aAb \mid e \; ; \; B \rightarrow cBd \mid e$

L_2 is not a CFL. To use the pumping lemma (PL) for a given n choose z as :

$z = a^n c^n b^n d^n \in L_2$ then $z = u\,v\,w\,x\,y$; with $|v\,w\,x| \leq n$; $|v\,x| > 0$

and by the PL for vwx one of the cases below must be true for $k \leq n$;

(i) $vwx = a^k$ or $= b^k$ or $= c^k$ or $= d^k$ which implies $uwy \notin L_2$ a contradiction to PL

(ii) $vwx = a^i c^j$ or $= c^i b^j$ or $= b^i d^j$ with $i+j \leq n$ which again implies

that $uwy \notin L_2$ a contradiction to PL since either #a's $\neq$ #b's or #c's $\neq$ #d's