Homework #6 *due December 13 ,2016,Tuesday*

Question 1

Consider the CFG $G = (V, \Sigma, R, S)$ *where* $V = \{S,A,B,C,D,E\}$, $\Sigma = \{a,b,c\}$ *and* R *is as given below* R *:*

$S \rightarrow AE \mid EB \mid C$
$A \rightarrow aA \mid a$
$B \rightarrow Bb \mid b$
$C \rightarrow Cc$
$D \rightarrow aCb \mid a \mid b \mid c$
$E \rightarrow aEb \mid e$

(a) *Remove all the null productions of* G *, if any, and call the result* G_1 **.**
(b) *Remove all the unitary productions of* G_1 *, if any , call the result* G_2 **.**
(c) *Remove all the non-generative and non-reachable symbols of this grammar, if any, and call the result* G_3 **.**
(d) *Compute the Chomsky Normal Form of* G_3 *using your results above.*
(e) *State in the simplest possible way the language generated by* G

Question 2

Consider the alphabet T *of terminals consisting of* **3** *pairs of matching left and right parentheses of three types, namely : { , } , [,] , (,)*

(a) *Describe a CFG ,* $G = (V, T, R, S)$ *such that* L_G *has the following properties : (i) every left parenthesis is balanced by a distinct right parenthesis somewhere on its right side and of its own type; (ii) a priority rule holds : no curly parenthesis - i.e. { or } - is contained within a rectangular pair – i.e. [ ] - or a plain pair – i.e. ( ) - ; and no rectangular parenthesis is contained within a plain pair; (iii) empty string is not a member of* L_G *.*
(b) *Using your grammar find a parse tree that derives the string: { ( ) [( )] } { }*

Main Text : Exercise 6.4.1 (a) ,(c) ; 6.4.2