Homework #6 *due to be announced*

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 <u>distinct</u> 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 6.2.6, 6.3.2, 6.4.1 (a) ,(c) ; 6.4.2