Question 1:

Consider the CFG given below:

S -> ASA | aB
A -> B | S
B -> b | ε
How many non-terminals need to be added to convert the above grammar into CNF? (1 mark)

A) 1
B) 4
C) 2
D) 3

We have added 3 new non-terminals.

Question 2:

Consider the CFG given below:

$S \rightarrow xSy|V$
$V \rightarrow Vz|\epsilon$

How many non-terminals should be added to convert the CFG into CNF?

A) 2
B) 4
C) 5
D) 3

We have added 5 new non-terminals

Question 3:

In the above Q. 2) How many different numbers of Null productions in the CFG to CNF converted form?

A) 0
B) 1
C) 2
D) 3

B) 1 null prod.

Question 4:

$S \rightarrow$ NN VP	0.50	$S \rightarrow$ VP NN	0.50
$NP \rightarrow$ NN PB	0.40	$PB \rightarrow$ PP NN	0.30
$VP \rightarrow$ VB NN	0.30	$VP \rightarrow$ VB NP	0.20
$VP \rightarrow$ NN VB	0.25	$VP \rightarrow$ NN PB	0.15
$PP \rightarrow$ with	0.10	$PP \rightarrow$ without	0.10
$VB \rightarrow$ play	0.30	$VB \rightarrow$ enjoy	0.20
$VB \rightarrow$ watch	0.25	$NN \rightarrow$ children	0.15
$NN \rightarrow$ cricket	0.15	$NN \rightarrow$ friends	0.20
$NN \rightarrow$ football	0.10	$NN \rightarrow$ music	0.12

For a sentence S = w1w2w3w4, assume that the cells in the table are indexed as follows:

	1	2	3	4	
w_1	11	12	13	14	1
w_2		22	23	24	2
w_3			33	34	3
w_4				44	4

Using CKY algorithm, find the probability score for the most probable tree for the sentence S_1 = "**children play cricket with friends**".

A) 5.06×10^{-4}
B) 2.73×10^{-3}
C) 1.62×10^{-6}
D) None of the above

Question 5

Using CKY algorithm, find the number of parse trees for the sentence S_2 = **children enjoy music** and the probability score for the most probable tree.

A) 1, 4.95×10^{-3}
B) 2, 0.36×10^{-3}
C) 3, 0.99×10^{-3}
D) 2, 0.54×10^{-3}

Question 6:

Which of the following grammars are valid CNF?

1. $A \rightarrow B$ 2. $A \rightarrow BCD$ 3. $A \rightarrow BC$
   $B \rightarrow CD$ $B \rightarrow b$ $B \rightarrow \epsilon$
   $C \rightarrow c$ $C \rightarrow c$ $C \rightarrow c$
   $D \rightarrow d$ $D \rightarrow d$

A) 1.
B) 2.
C) 3.
D) None of the above

Option D) None of them are valid

1. A -> B (X -> YZ, X -> a)
2. A -> BCD
3. A -> BC
   B -> CD | b | epsilon
   C -> c
   D -> d

Question 7:

Which of the following are true?

A) Given a CFG and its corresponding CNF, they produce different languages.
B) It requires '2n-1' productions or steps in CNF to generate a string w of length 'n'.
C) For a given grammar, there can be more than one CNF.
D) None of the above

Multi choice multi correct

B), C)