Q1. G1 : S -> ABS

S -> AB

A -> Aa

A -> a

B -> bA

aabaab

S -> ABS -> aABS -> aaBS -> aaBAB -> aabAAB -> aabaAB -> aabaaB -> aabaabA

Will not be accepted by G1 because none of the non-terminal can't step to an element of the set { V U epsilon star } that leads to the end with terminal 'b'

aaaaba

this string will be accepted G1

aabbaa

this string will not be accepted by string G1 because the non-terminal can't step to an element of the set (V U epsilon star) that lead to the terminal that have a pair 'bb'.

abaaba

this string could be accepted by G1

Q2

Let R is RegExp

T is Term

F is Factor

L is Letter

G2 : R -> T | T + R | (R) | 0

T -> F | TF

F -> L | F *

L -> c | 1 | R (c is an element of epsilon)

R-> T + R -> T.F + R -> T.F* + R

TR* + R -> T(R)* +R -> T(T+R)* +R

T(T+ T+R) +R -> T(T.F + T+R)* + R

T(FF + T +R) + R -> R -> T(LF + T + R)* +R

T(bF + T + R)* + R -> T(bL +T+R)* + R

T(ba + T + R)*+R -> T(ba + F+ R)* + R

T(ba + L +R)* + R-> T(ba + b+ R)* +R

T(ba + b + T)* R -> T(ba + b +TF)* + R

T(ba + b + FF)* + R -> T(ba + b +LF)* + R

T(ba + b + LL)* +R ->T(ba + b + bL)* + R

T(ba + b +bb)* + R ->FF*(ba +b+bb)* + R

LF*(ba + b + bb)* +R -> LL*(ba + b+ bb)* + R

aL*(ba + b+ bb)* + R-> ab*(ba + b + bb)* +R

ab*(ba+b+bb) + T + R -> ab*(ba + b+ bb)* +T +T

ab*(ba+b+bb) +TF +T -> ab*(ba+ b+bb)* + T + T

ab*(ba + b+ bb)* + T L L + T

ab*(ba + b + bb)* + T ba + T

ab (ba + b + bb)* + Fba + F

ab(ba + b +bb)* + Lba + L

ab(ba +b +bb)* + aba + 1

Q.3

G3 : S -> X|Y|Z

X -> C D

C -> aE

E -> epsilon | bE

D -> epsilon | FD

F -> G|H|I

G -> B A

H -> B

I -> B

Y -> ABA

Z -> epsilon

A -> a

B ->b

Q4

String that are accepted are : b, aba, aabaa, aaabaaa, bb, abba, aabbaa, etc. The CFG will look like:

S -> aSa | B

B -> bB'

B' -> bB' | epsilon

To create a CNF we will need to

1. Remove NULL rules
2. Remove unit rules
3. Remove more than 1 terminal on the Rtts
4. Remove more than 2 non-terminal on the Rtts