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CS 4280

Homework 6

1. Remove all left recursions.

A --> Aa | aA | aAa

B --> Bb | CBa

C --> Ba | ba

Answer:

A --> aAA’ | aAaA’

A’ --> aA’ | empty

B --> CBaB’

B’ --> bB’ | empty

C --> Ba | ba

2. Show the below is or not LL(1)

A --> aCd | baB | empty

B --> bb | Ca | empty

C --> ccC | aa

Answer:

- First(aCd) = {a} First(baB) = {b} Follow(A) = {EOFtk} -----> k = 1

- First(bb) = {b} First(Ca) = {c a} Follow(B) = {EOFtk} -----> k = 1

- First(ccC) = {c} First(aa) = {a} ------> k = 1

- The given grammar is also not left recursion.

Therefor, the grammar is LL(1).

3. Left factorize so that the grammar is LL(1) if possible.

A --> aA | abbB | a | C

B --> bBb | bBa | aC

C --> cc | aC

Answer:

A --> aA | abbB | a | cc | aC

A --> aX | cc

X --> A | bbB | C | empty

B --> bBb | bBa | aC

B --> bBY | aC

Y --> b | a

A --> aX | cc First(aX) = {a} First(cc) = {c} ------> k = 1

X --> A | bbB | C | empty First(A) = { a c } First(bbB) = {b} First(C) = {c a} Follow(X) = {EOFtk} -----> k > 1

B --> bBY | aC First(bBY) = {b} First(aC) = {a} ------> k = 1

Y ---> b | a First(b) = {b} First(a) = {a} -------> k = 1

C --> cc | aC First(cc) = {c} First(aC) = {a} ------> k = 1

Since, one of the k value is greater than 1, therefore, the grammar is not LL(1).