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CSCI-305
Chapter 4 Homework

1. Perform the pairwise disjointness test for the following grammar rules.

a.) S → aSb | bAA

Step 1.
FIRST(aSb) = {a}
FIRST(bAA) = {b}
Step 2.
FIRST(aSb) ∩ *FIRST*(bAA) = ∅
Is the same as,
{a} ∩ {b} = ∅

Answer: **Passes the test**

b. A → B{aB} | a

Step 1.
FIRST(B{aB}) = {b}
FIRST(a) = {a}
Step 2.
FIRST(B{aB}) ∩ *FIRST*(a) = ∅
Is the same as,
{b} ∩ {a} = ∅

Answer: **Passes the test**

c. B → aB | a

Step 1.
FIRST(aB) = {a}
FIRST(a) = {a}
Step 2.
FIRST(aB) ∩ *FIRST*(a) = {a} ≠ ∅
Is the same as,
{a} ∩ {a} = {a} ≠ ∅

Answer: **Fails the test**

2. Show a trace of the recursive descent parser given in Section 4.4.1 (in the book) for the string a + b * c .

Next token is: 11 Next lexeme is a
Enter <expr>
Enter <term>
Enter <factor>
Next token is: 21 Next lexeme is +
Exit <factor>
Exit <term>
Next token is: 11 Next lexeme is b
Enter <term>
Enter <factor>
Next token is: 23 Next lexeme is *
Exit <factor>
Next token is: 11 Next lexeme is c
Enter <factor>
Next token is: -1 Next lexeme is EOF
Exit <factor>
Exit <term>
Exit <expr>

3. Given the following grammar and the right sentential form, draw a parse tree and show the phrases and simple phrases, as well as the handle.

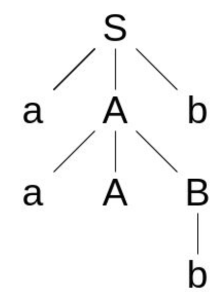
S→aAb | bBA A→ab | aAB B→aB | b

a. aaAbb

<u>Phrases:</u> aaAbb, aaABb, aAb

<u>Simple Phrases:</u> b

<u>Handle:</u> b

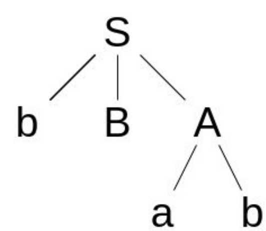


b. bBab

<u>Phrases:</u> bBab, bBA

<u>Simple Phrases:</u> ab

<u>Handle:</u> ab



c. aaAbBb

aaAbBb → aSBb → aSBB → X

The last string cannot be derived from the given grammar, therefor the phrase, simple phrase or handle cannot be calculated.

4. Design a state diagram to recognize the floating-point literals of your favorite programming language. Similar to the state diagram from the book that I used numerous times in the lecture videos.