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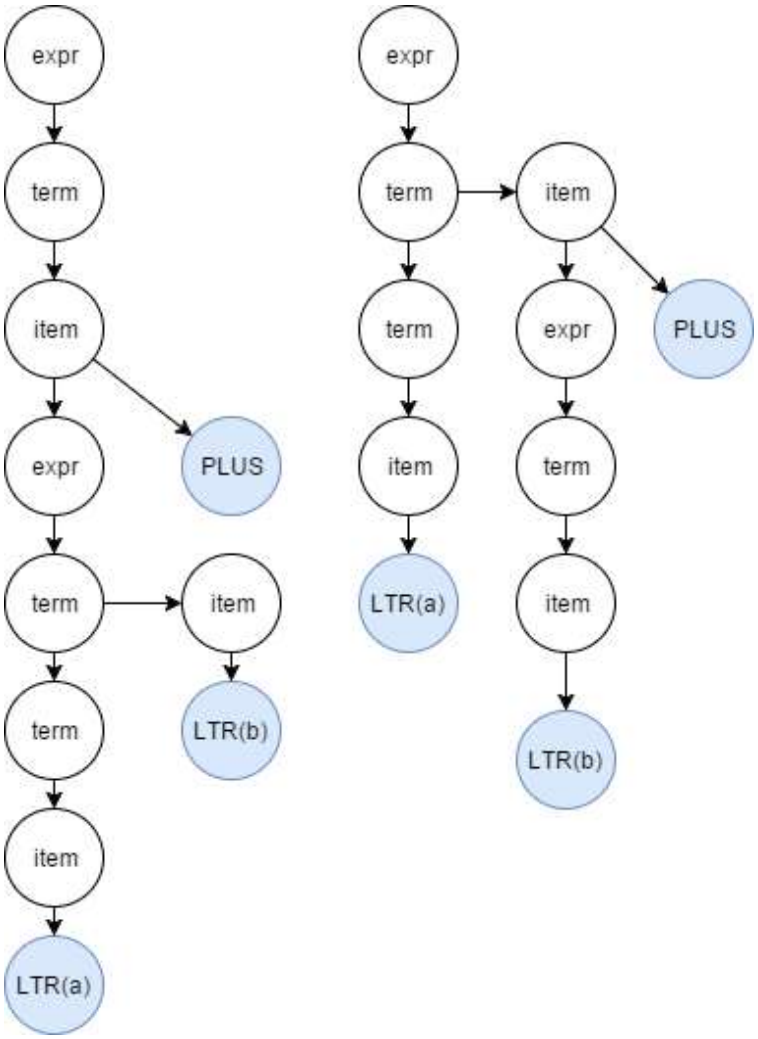
CS 536 - Professor Thomas Reps

Homework 5

CFG 1

Ambiguous grammar. Below are two trees for the string “ab+”. The left effectively yields (ab)+ while the right yields ab+ as hoped for, but they are both possible with the grammar.



CFG 2

It is unable to derive the valid regex:

- (ab)+

The STAR and PLUS operators are applied to “item” which only derives epsilon or a single letter, rather than an expression

CFG 3

It incorrectly accepts the invalid regexes:

- a|
- (ab)|

The ε derivation allows the grammar to derive an empty sequence after the OR terminal, which is not valid.

CFG 4

It is unable to derive the valid regex:

- (ab)+

Parenthesized expressions can only be a single letter or an empty sequence due to “item” deriving just just those two, or itself with a STAR or PLUS operator. This is similar to CFG 2.

CFG 5

This CFG is ambiguous. Take the valid regex, “ab+” for example. The left tree reads this correctly as “ab+”, but the second effectively reads it as “(ab)+”, but both read the same string.