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CSCE A331
Homework 1
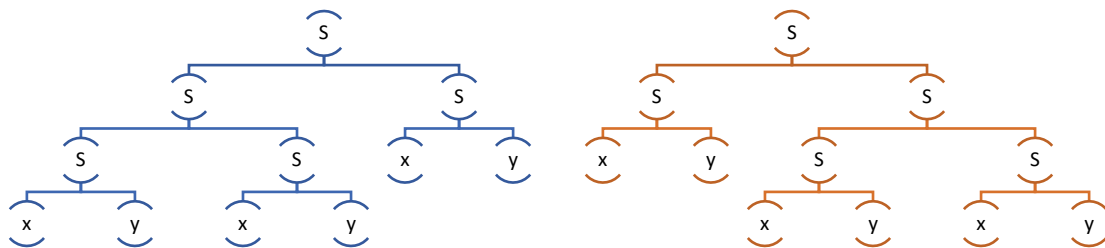
1. The Magic Words are Squeamish Ossifrage
2.
    a. Static.
    b. Type checking is done before the program is executed (when compiling to byte code).
3. a, f
4. One or more a's followed by an equal number of b's ending with an even number of c's.
5. c, d, e, g
6. $(a|b)^*a(a|b)^*$
7.
    a. $S \rightarrow \underline{S}S \rightarrow xy\underline{S} \rightarrow xyxy$
    b. $S \rightarrow S\underline{S} \rightarrow \underline{S}xy \rightarrow xyxy$
    c. xyxyxy

    d. $S \rightarrow xyS \mid xy$
8.
    a. $axxx^*$
    b.

    c. $S \rightarrow axxT$
       $T \rightarrow xT \mid \varepsilon$
    d. No. Each production can only expand to at most one new variable. Because of this, the order in which you expand each variable cannot change and any given string can only have one parse tree. In other words, any CFG whose productions expand to no more than one new variable is inherently non-ambiguous.
9.

```
<reg-exp> ::= <single-char> | <epsilon> | <reg-exp> <reg-exp> | "(" <reg-exp> ")" |
        <reg-exp> "*" | <reg-exp> "|" <reg-exp>
```