Linguistics 106
Homework Seven
Context Free Grammars (2)

Due: Tuesday, 6 August 2002, before 5 pm; please put in my mail-slot at 619 Williams Hall

Let the language \( L \) comprise all strings that can be produced with one of the following four schemas by consecutively selecting one word from each set.

\[
\begin{align*}
\text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{laugh} & \quad \text{with a smirk} \\
\text{both} & \quad \text{girl} & \quad \text{chump} & \quad \epsilon \\
\text{the} & \quad \text{boy} & \quad \text{laugh} & \quad \text{with a smirk} \\
\text{every} & \quad \text{girl} & \quad \text{chump} & \quad \epsilon \\
\text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{eye} & \quad \text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{with a smirk} \\
\text{both} & \quad \text{girl} & \quad \text{tease} & \quad \text{both} & \quad \text{girl} & \quad \text{chump} & \quad \epsilon \\
\text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{eye} & \quad \text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{with a smirk} \\
\text{every} & \quad \text{girl} & \quad \text{tease} & \quad \text{every} & \quad \text{girl} & \quad \text{chump} & \quad \epsilon \\
\text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{eye} & \quad \text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{with a smirk} \\
\text{both} & \quad \text{girl} & \quad \text{tease} & \quad \text{both} & \quad \text{girl} & \quad \text{chump} & \quad \epsilon \\
\text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{eye} & \quad \text{the} & \quad \text{boy} & \quad \{s\} & \quad \text{with a smirk} \\
\text{every} & \quad \text{girl} & \quad \text{tease} & \quad \text{every} & \quad \text{girl} & \quad \text{chump} & \quad \epsilon
\end{align*}
\]

Assume that the alphabet of \( L \) is the following set of 15 symbols:

\{ smirk, boy, girl, freak, chump, a, the, every, both, s, sing, laugh, eye, tease, with \}
Assignment:


Constraints:

(a) Do not give a CFG that also counts as a Regular Grammar!

(b) Try to have the CFG match your intuitions about the structure of these sentences in English. Specifically, try to have the non-terminals you use correspond to grammatical categories of English.
   For example, suppose you have a rule: $S \to A B$. Then $A$ and $B$ should correspond to the major parts of $S$, according to your intuitions about English.

(c) If a string in $L$ has two meanings in English, then make sure it has two derivations in $L$, corresponding to the difference in meaning.

2. Using the grammar you design, give derivation trees for 4 sentences of $L$, one from each row above.

3. For some string in $L$ that has two meanings, show the two distinct structural descriptions which your grammar assigns that string. Explain why the structural difference corresponds to the meaning difference.