CSE322

Comparison of deterministic and nondeterministic versions & closure properties

Lecture #34

Union Closure Properties

Lemma: Let A_1 and A_2 be two CF languages, then the *union* $A_1 \cup A_2$ is context free as well.

Proof: Assume that the two grammars are $G_1=(V_1,\Sigma,R_1,S_1)$ and $G_2=(V_2,\Sigma,R_2,S_2)$.
Construct a third grammar $G_3=(V_3,\Sigma,R_3,S_3)$ by:
$V_3 = V_1 \cup V_2 \cup \{ S_3 \}$ (new start variable) with
$R_3 = R_1 \cup R_2 \cup \{ S_3 \rightarrow S_1 \mid S_2 \}$.

It follows that $L(G_3) = L(G_1) \cup L(G_2)$.

Intersection & Complement?

Let again A_1 and A_2 be two CF languages.

One can prove that, *in general,*
the intersection $A_1 \cap A_2$,
and
the complement $\bar{A}_1 = \Sigma^* \setminus A_1$
are not context free languages.

One proves this with specific counter examples of languages (see homework).