

CSI 409: Sample problems on context-free languages

1. Construct a context-free grammar for the *complement* of the language $(a \cup ba)^*b$. (The alphabet is $\{a, b\}$.)

2. Exhibit a context-free grammar for the language

$$L = \{a^k b^m \mid 0 \leq k \leq 2m\}$$

The alphabet is $\{a, b\}$.

3. Exhibit a context-free grammar for the language

$$L = \{a^k b^m \mid 2k > m \geq 0\}$$

The alphabet is $\{a, b\}$.

4. Show that the language

$$\{wcw^R \mid w \in a^+b^+\}$$

is context-free. The alphabet is $\{a, b, c\}$.