

Please place your net ID in upper right corner of your homework

1. Consider the context free grammar

$$\begin{array}{ll} S \rightarrow bA & S \rightarrow aB \\ A \rightarrow a & B \rightarrow b \\ A \rightarrow aS & B \rightarrow bS \\ A \rightarrow bAA & B \rightarrow aBB \end{array}$$

Prove that the context free grammar generates the language consisting of all strings of a 's and b 's with an equal number of a 's and b 's. Your grade will depend on the neatness of you write up.

2. Write a context-free grammar for $\{(a^*b)^i c^i \mid i > 0\}$.
3. Write a context-free grammar for $\{a^i b^j c^k \mid i + k = j\}$.
4. Write a context-free grammar for $\{a^i b^j c^k d^l \mid i = k \text{ or } j = l\}$.
5. Write a context-free grammar for the complement of $\{a^i b^j c^k \mid i \leq j \leq k\}$.