
Homework 10 — Due: Tuesday, November 8, 2022

Please submit your work on Brightspace, in PDF format only.

1. Show that if α and β are any positive constants, then $L = \{0^n 1^m \mid \alpha m \leq \beta n\}$ is a context-free language.

2. Show that $L = \{0^n 1^m \mid m \leq n^2\}$ is not a context-free language.

3. Let G be the following CFG in Chomsky Normal Form:

$$\begin{aligned} S &\to LA \\ A &\to BR \\ B &\to LA \\ B &\to BB \\ B &\to LR \\ L &\to (\\ R &\to) \end{aligned}$$

   Carry out the CYK algorithm by hand for the input strings (())() and ())((). In each case, show the results in the form of boolean matrices for $D(i, l, X)$, where $X \in \{S, A, B, L, R\}$.