Prework 2.1a: Context-Free Grammars

Write your preliminary solutions to each problem and submit a PDF on Canvas. The names in brackets indicate the subset responsible for presenting the problem.

1. [Joshua, Grace, Meghan] Consider the grammar with start variable S, terminals $\Sigma = \{\text{Moe}, \text{Larry}, \text{Curly}, \text{hit}, \text{poked}, \text{kicked}\}$ and the following three rules.

$$\begin{aligned} S &\to N\ V\ N \\ N &\to \text{Moe} \mid \text{Larry} \mid \text{Curly} \\ V &\to \text{hit} \mid \text{poked} \mid \text{kicked} \end{aligned}$$

   Give a derivation for the string "Moe kicked Larry".

Problems 2 and 3 refer to the following grammar with terminals $\Sigma = \{\texttt{a}, +, *, (,)\}$. By convention, the start variable is the leftmost variable in the first rule (in this case, E).

$$\begin{aligned} E &\to E + T \mid T \\ T &\to T * F \mid F \\ F &\to (E) \mid \texttt{a} \end{aligned}$$

2. [Levi, Curtis, Micah] Give a derivation for the string $\texttt{a} + \texttt{a} + \texttt{a}$, and illustrate your derivation with a tree (or some other way).
3. [Connor, Todd, David] Give a derivation for the string $((\texttt{a}))$, and illustrate your derivation with a tree (or some other way).
4. [Allie, Ky, Andrew, Ben] Define a grammar that describes the set of all palindromes in $\Sigma = \{\texttt{0}, \texttt{1}\}$, and give a derivation for $\texttt{0110}$.

BEGIN YOUR SOLUTIONS BELOW THIS LINE