Recap: Definition of CFG

A CFG \( G = (N, T, P, S) \) where

- \( N \) is a finite set of nonterminals (or variables or syntactic categories)
- \( T \) is a finite set of terminals
- \( N \cap T = \emptyset \) (disjoint)
- \( P \) is a finite set of productions of the form \( A \rightarrow \alpha \) where \( A \in N \) and \( \alpha \in (N \cup T)^* \)
- \( S \in N \) is the start symbol

Simple Arithmetic Expressions

\[ SAE = (N = \{E, I, D\}, T = \{+, *, (, ), 0, 1\}, P, E) \]
where \( P \) is given by:

\[
E \rightarrow E + E \\
| E \* E \\
| (E) \\
| I \\
I \rightarrow DI | D \\
D \rightarrow 0 | 1
\]

Note: \( A \rightarrow \alpha | \beta \) shorthand for \( A \rightarrow \alpha, A \rightarrow \beta \).

Another Example: Java

The syntax of programming languages is invariably specified by CFGs.