1 Tutorial

1.1 Syntax

$$
\begin{aligned}
Expr ::=\ & Num\ | \\
& \triangle Expr\ | \\
& Expr \odot Expr,
\end{aligned} \tag{1}
$$

where Num is a predefined set of integer numbers (a.k.a. Z).

1.2 Small-Step Operational Semantics

Convention: $e, e', e_1, e_2, \ldots \in Expr$ and $n, n', n_1, n_2, \ldots \in Num$.

$$
\overline{\triangle n \Rightarrow -n} \tag{2}
$$

$$
\overline{n \odot n' \Rightarrow n + n'} \tag{3}
$$

$$
\frac{e \Rightarrow e'}{\triangle e \Rightarrow \triangle e'} \tag{4}
$$

$$
\frac{e_1 \Rightarrow e'}{e_1 \odot e_2 \Rightarrow e' \odot e_2} \tag{5}
$$

$$
\frac{e_2 \Rightarrow e'}{e_1 \odot e_2 \Rightarrow e_1 \odot e'} \tag{6}
$$

1.3 Big-Step Operational Semantics

$$
\overline{n \Longrightarrow n} \tag{7}
$$

$$
\frac{e \Longrightarrow n}{\triangle e \Longrightarrow -n} \tag{8}
$$

$$
\frac{e \Longrightarrow n \quad e' \Longrightarrow n'}{e \odot e' \Longrightarrow n + n'} \tag{9}
$$

Please note: $\Rightarrow\ \in Expr \times Expr$, $\Longrightarrow\ \in Expr \times Num$