Mini-Project 1 Check-in Written Solutions

Small-Step Semantics

$$\frac{e_1 \longrightarrow e_1'}{\texttt{(+}\ e_1\ e_2\texttt{)} \longrightarrow \texttt{(+}\ e_1'\ e_2\texttt{)}}\ (\textsf{addLeft}) \qquad \frac{n \in \mathbb{Z} \qquad e_2 \longrightarrow e_2'}{\texttt{(+}\ n\ e_2\texttt{)} \longrightarrow \texttt{(+}\ n\ e_2'\texttt{)}}\ (\textsf{addRight})$$

$$\frac{n_1 \in \mathbb{Z} \qquad n_2 \in \mathbb{Z} \qquad n_1 + n_2 = n}{\texttt{(+}\ n_1\ n_2\texttt{)} \longrightarrow n}\ (\textsf{addNum})$$

$$\frac{e_1 \longrightarrow e_1'}{\texttt{(<}\ e_1\ e_2\texttt{)} \longrightarrow \texttt{(<}\ e_1'\ e_2\texttt{)}}\ (\textsf{ltLeft}) \qquad \frac{n \in \mathbb{Z} \qquad e_2 \longrightarrow e_2'}{\texttt{(<}\ n\ e_2\texttt{)} \longrightarrow \texttt{(<}\ n\ e_2'\texttt{)}}\ (\textsf{ltRight})$$

$$\frac{n_1 \in \mathbb{Z} \qquad n_2 \in \mathbb{Z} \qquad n_1 < n_2}{\texttt{(<}\ n_1\ n_2\texttt{)} \longrightarrow \texttt{true}}\ (\textsf{ltTrue}) \qquad \frac{n_1 \in \mathbb{Z} \qquad n_2 \in \mathbb{Z} \qquad n_1 \geq n_2}{\texttt{(<}\ n_1\ n_2\texttt{)} \longrightarrow \texttt{false}}\ (\textsf{ltFalse})$$

$$\frac{e_1 \longrightarrow e_1'}{\texttt{(?}\ e_1\ e_2\ e_3\texttt{)} \longrightarrow \texttt{(?}\ e_1'\ e_2\ e_3\texttt{)}}\ (\textsf{ifCond})$$

$$\frac{}{\texttt{(?}\ \texttt{true}\ e_2\ e_3\texttt{)} \longrightarrow e_2}\ (\textsf{ifTrue}) \qquad \frac{}{\texttt{(?}\ \texttt{false}\ e_2\ e_3\texttt{)} \longrightarrow e_3}\ (\textsf{ifFalse})$$

Note. There should be no rules which reduce literals. According to our definition, no expression should reduce to itself here.

Note. There is a lot of variation in the possible solutions here. To the graders, do your best to verify that a student's submission is correct, even if it doesn't exactly match the above. To the students, please be gracious to our graders and make sure that you've thought carefully about any regrade requests you submit.