Static Semantics of Arith

$$\frac{(x \in \Gamma)}{\Gamma \vdash \texttt{var}(x)\ \texttt{ok}} \quad \text{(S1)} \qquad \frac{(n \in \texttt{Nat}}{\Gamma \vdash \texttt{num}(n)\ \texttt{ok}} \quad \text{(S2)}$$

$$\frac{\Gamma \vdash e_1\ \texttt{ok} \quad \Gamma \vdash e_2\ \texttt{ok}}{\Gamma \vdash \texttt{plus}(e_1, e_2)\ \texttt{ok}} \quad \text{(S3)} \qquad \frac{\Gamma \vdash e_1\ \texttt{ok} \quad \Gamma \vdash e_2\ \texttt{ok}}{\Gamma \vdash \texttt{times}(e_1, e_2)\ \texttt{ok}} \quad \text{(S5)}$$

$$\frac{\Gamma \vdash e_1\ \texttt{ok} \quad \Gamma \cup \{x\} \vdash e_2\ \texttt{ok}}{\Gamma \vdash \texttt{let}(e_1, x.e_2)\ \texttt{ok}} \quad \text{(S5)}$$

Dynamic Semantics of Arith

$$\frac{(m + n = p)}{\texttt{plus}(\texttt{num}(m), \texttt{num}(m) \mapsto \texttt{num}(p)} \quad \text{(E1)} \qquad \frac{(m * n = p)}{\texttt{times}(\texttt{num}(m), \texttt{num}(m) \mapsto \texttt{num}(p)} \quad \text{(E2)}$$

$$\frac{}{\texttt{let}(\texttt{num}(n), x.e_2) \mapsto \{\texttt{num}(n)/x\}e_2} \quad \text{(E3)}$$

$$\frac{e_1 \mapsto e_1'}{\texttt{plus}(e_1, e_2) \mapsto \texttt{plus}(e_1', e_2)} \quad \text{(E4)} \qquad \frac{e_2 \mapsto e_2'}{\texttt{plus}(\texttt{num}(n), e_2) \mapsto \texttt{plus}(\texttt{num}(n), e_2')} \quad \text{(E5)}$$

$$\frac{e_1 \mapsto e_1'}{\texttt{times}(e_1, e_2) \mapsto \texttt{times}(e_1', e_2)} \quad \text{(E6)} \qquad \frac{e_2 \mapsto e_2'}{\texttt{times}(\texttt{num}(n), e_2) \mapsto \texttt{times}(\texttt{num}(n), e_2')} \quad \text{(E7)}$$

$$\frac{e_1 \mapsto e_1'}{\texttt{let}(e_1, x.e_2) \mapsto \texttt{let}(e_1', x.e_2)} \quad \text{(E8)}$$