

x variables
 i integer literals
 $\tau, \sigma ::=$ types
 $\begin{array}{l} | \mathbb{Z} \\ | \mathbf{void} \\ | \tau_1 \rightarrow \tau_2 \\ | \tau_1 \times \tau_2 \\ | (\tau) \end{array}$ S

$e ::=$ annotated terms
 $| u^\tau$

$u ::=$ raw terms
 $\begin{array}{l} | x \\ | i \\ | \lambda(x : \tau).e \quad \text{bind } x \text{ in } e \\ | e_1 e_2 \\ | e_1 p e_2 \\ | \text{if0}(e_1, e_2, e_3) \\ | \text{let } x = e \text{ in } u \quad \text{bind } x \text{ in } u \\ | \text{halt } e \\ | (u) \end{array}$ S

$p ::=$ primitives
 $\begin{array}{l} | + \\ | - \end{array}$

$\Gamma ::=$ contexts
 $| \Gamma, x : \tau$

$\boxed{\Gamma \vdash_{\mathbf{T}} e : \tau}$ annotated typing

$$\frac{\Gamma \vdash_{\mathbf{T}} u : \tau}{\Gamma \vdash_{\mathbf{T}} u^\tau : \tau} \quad \mathbf{T_ANT_ANN}$$

$\boxed{\Gamma \vdash_{\mathbf{T}} u : \tau}$ typing

$$\frac{\Gamma(x) = \tau}{\Gamma \vdash_{\mathbf{T}} x : \tau} \quad \mathbf{T_TERM_VAR}$$

$$\frac{}{\Gamma \vdash_{\mathbf{T}} i : \mathbb{Z}} \quad \mathbf{T_TERM_INT}$$

$$\frac{\Gamma, x_1 : \tau_1 \vdash_{\mathbf{T}} e : \tau_2}{\Gamma \vdash_{\mathbf{T}} \lambda(x_1 : \tau_1).e : \tau_1 \rightarrow \tau_2} \quad \mathbf{T_TERM_LAM}$$

$$\frac{\begin{array}{l} \Gamma \vdash_{\mathbf{T}} e_1 : \tau_1 \rightarrow \tau_2 \\ \Gamma \vdash_{\mathbf{T}} e_2 : \tau_1 \end{array}}{\Gamma \vdash_{\mathbf{T}} e_1 e_2 : \tau_2} \quad \mathbf{T_TERM_APP}$$

$$\frac{\begin{array}{l} \Gamma \vdash_{\mathbf{T}} e_1 : \mathbb{Z} \\ \Gamma \vdash_{\mathbf{T}} e_2 : \mathbb{Z} \end{array}}{\Gamma \vdash_{\mathbf{T}} e_1 p e_2 : \mathbb{Z}} \quad \mathbf{T_TERM_PRIM}$$

$$\frac{\begin{array}{c} \Gamma \vdash_{\mathbf{T}} e_1 : \mathbb{Z} \\ \Gamma \vdash_{\mathbf{T}} e_2 : \tau \\ \Gamma \vdash_{\mathbf{T}} e_3 : \tau \end{array}}{\Gamma \vdash_{\mathbf{T}} \text{if0}(e_1, e_2, e_3) : \tau} \quad \mathbf{T_TERM_IF0}$$

$\boxed{\Gamma \vdash_{\mathbf{K}} e : \tau}$ annotated typing

$$\frac{\Gamma \vdash_{\mathbf{K}} u : \tau}{\Gamma \vdash_{\mathbf{K}} u^\tau : \tau} \quad \mathbf{K_ANT_ANN}$$

$\boxed{\Gamma \vdash_{\mathbf{K}} u : \tau}$ typing

$$\frac{\Gamma(x) = \tau}{\Gamma \vdash_{\mathbf{K}} x : \tau} \quad \mathbf{K_TERM_VAR}$$

$$\frac{}{\Gamma \vdash_{\mathbf{K}} i : \mathbb{Z}} \quad \mathbf{K_TERM_INT}$$

$$\frac{\Gamma, x : \tau \vdash_{\mathbf{K}} e : \text{void}}{\Gamma \vdash_{\mathbf{K}} \lambda(x : \tau).e : \tau \rightarrow \text{void}} \quad \mathbf{K_TERM_LAM}$$

$$\frac{\begin{array}{c} \Gamma \vdash_{\mathbf{K}} e : \tau \\ \Gamma, x : \tau \vdash_{\mathbf{K}} u : \text{void} \end{array}}{\Gamma \vdash_{\mathbf{K}} \text{let } x = e \text{ in } u : \text{void}} \quad \mathbf{K_TERM_LET}$$

$$\frac{\begin{array}{c} \Gamma \vdash_{\mathbf{K}} e_1 : \mathbb{Z} \\ \Gamma \vdash_{\mathbf{K}} e_2 : \mathbb{Z} \end{array}}{\Gamma \vdash_{\mathbf{K}} e_1 \text{ p } e_2 : \mathbb{Z}} \quad \mathbf{K_TERM_PRIM}$$

$$\frac{\begin{array}{c} \Gamma \vdash_{\mathbf{K}} e' : \tau \rightarrow \text{void} \\ \Gamma \vdash_{\mathbf{K}} e : \tau \end{array}}{\Gamma \vdash_{\mathbf{K}} e' e : \text{void}} \quad \mathbf{K_TERM_APP}$$

$$\frac{\begin{array}{c} \Gamma \vdash_{\mathbf{K}} e : \mathbb{Z} \\ \Gamma \vdash_{\mathbf{K}} e_1 : \text{void} \\ \Gamma \vdash_{\mathbf{K}} e_2 : \text{void} \end{array}}{\Gamma \vdash_{\mathbf{K}} \text{if0}(e, e_1, e_2) : \text{void}} \quad \mathbf{K_TERM_IF0}$$

$$\frac{\Gamma \vdash_{\mathbf{K}} e : \tau}{\Gamma \vdash_{\mathbf{K}} \text{halt } e : \text{void}} \quad \mathbf{K_TERM_HALT}$$

Definition rules: 16 good 0 bad
Definition rule clauses: 39 good 0 bad