The Simply Typed Lambda-Calculus

τ	::=		Types
	$\mid$	$\mathbb{Z}$	Integer type
	$\mid$	$\tau_1 \to \tau_2$	Function
e	::=		Expressions
	$\mid$	x	Variable
	$\mid$	$e_1\ e_2$	Application
	$\mid$	$\lambda x{:}\tau.e$	Abstraction
Γ	::=		Contexts
	$\mid$	$\bullet$	Empty context
	$\mid$	$\Gamma, x{:}\tau$	Variable binding

$\boxed{\Gamma \vdash e : \tau}$ Expression typing

$$\frac{x{:}\tau \in \Gamma}{\Gamma \vdash x : \tau}\ \text{E\_Var}$$

$$\frac{\Gamma \vdash e_1 : \tau_1 \to \tau_2 \qquad \Gamma \vdash e_2 : \tau_1}{\Gamma \vdash e_1\ e_2 : \tau_2}\ \text{E\_App}$$

$$\frac{\Gamma, x{:}\tau_1 \vdash e : \tau_2}{\Gamma \vdash \lambda x{:}\tau_1.e : \tau_1 \to \tau_2}\ \text{E\_Abs}$$

Example: $\bullet \vdash \lambda x{:}\mathbb{Z}.x + 1 : \mathbb{Z} \to \mathbb{Z}$
Example: $\bullet \vdash \lambda x{:}\mathbb{Z} \to \mathbb{Z}.\lambda y{:}\mathbb{Z}.x\ y : \mathbb{Z}$