$$pair \triangleq \lambda a.\ \lambda b.\ (\lambda f.\ f\ a\ b)$$

$$int \times bool = \forall \gamma.\ (int \to bool \to \gamma) \to \gamma$$

$$pair \triangleq \Lambda\alpha.\Lambda\beta.\lambda a:\alpha.\ \lambda b:\beta.\ \Lambda\gamma.\ \lambda f:\alpha\to\beta\to\gamma.\ f\ a\ b$$

: "PAIR OF α AND β"

pair [int] [bool] 5 true

: Pair int bool

$$Pair \triangleq \lambda\alpha:type.\ \lambda\beta:type.\ \forall\gamma.\ (\alpha\to\beta\to\gamma)\to\gamma$$

$\lambda\omega$

$$\tau ::= b \mid \tau_1 \to \tau_2 \mid \alpha \mid \lambda\alpha:\kappa.\ \tau \mid \tau_1\ \tau_2$$

$b ::= \text{int} \mid \text{bool}$

$\kappa ::= \text{type} \mid \kappa_1 \Rightarrow \kappa_2$

: type ⇒ type ⇒ type

$\Delta; \Gamma \vdash e : \tau$

↑ TVar → Kind

$$\frac{\Delta \vdash \tau : \text{type}}{\Delta; \Gamma, x : \tau \vdash x : \tau}$$

~~$\Delta \vdash \tau$ ok~~

$\Delta \vdash \tau : \kappa$

$$\frac{\Delta \vdash \tau_1 : \text{type} \qquad \Delta; \Gamma, x : \tau_1 \vdash e : \tau_2}{\Delta; \Gamma \vdash \lambda x : \tau_1 . e : \tau_1 \to \tau_2}$$

$$\frac{\Delta; \Gamma \vdash e_1 : \tau_1 \to \tau_2 \qquad \Delta; \Gamma \vdash e_2 : \tau_1}{\Delta; \Gamma \vdash e_1\ e_2 : \tau_2}$$

Pair int bool $\equiv \forall \gamma . (\text{int} \to \text{bool} \to \gamma) \to \gamma$

$$\frac{\Delta; \Gamma \vdash e : \tau \qquad \tau \equiv \tau' \qquad \Delta \vdash \tau' : \text{type}}{\Delta; \Gamma \vdash e : \tau'}$$

TYPES ↑ KINDS ↓

$$\frac{}{\Delta, \alpha : \kappa \vdash \alpha : \kappa} \qquad \frac{\Delta, \alpha : \kappa_1 \vdash \tau : \kappa_2}{\Delta \vdash \lambda \alpha : \kappa . \tau : \kappa_1 \Rightarrow \kappa_2}$$

$$\frac{}{\Delta \vdash b : \text{type}} \qquad \frac{\Delta \vdash \tau_1 : \text{type} \qquad \Delta \vdash \tau_2 : \text{type}}{\Delta \vdash \tau_1 \to \tau_2 : \text{type}}$$

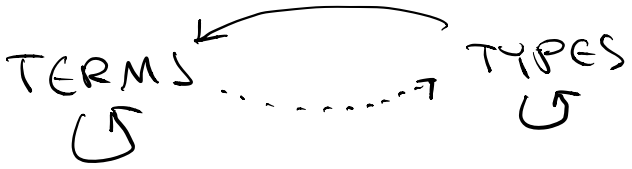
$$\frac{}{\tau \equiv \tau} \qquad \frac{\tau_1 \equiv \tau_2}{\tau_2 \equiv \tau_1} \qquad \frac{\tau_1 \equiv \tau_2 \qquad \tau_2 \equiv \tau_3}{\tau_1 \equiv \tau_3}$$

$$\frac{\tau_1 \equiv \tau_1' \qquad \tau_2 \equiv \tau_2'}{\tau_1 \to \tau_2 \equiv \tau_1' \to \tau_2'} \qquad \frac{\tau \equiv \tau'}{\lambda x : \kappa . \tau \equiv \lambda x : \kappa . \tau'} \qquad \frac{\tau_1 \equiv \tau_1' \qquad \tau_2 \equiv \tau_2'}{\tau_1 \; \tau_2 \equiv \tau_1' \; \tau_2'}$$

$$\frac{}{(\lambda \alpha : \kappa . \tau_1) \; \tau_2 \equiv \tau_1 \{\tau_2 / \alpha\}}$$

List List<Integer>

List<τ> := ArrayList<τ>


TERMS
TYPES