# Type translation

$\tau^{+} = \tau$ $\qquad$ $\tau^{\div} = E^{o}\tau^{+}$

$$\begin{aligned}
\mathsf{unit}^{+} &= \mathsf{unit} \\
\mathsf{bool}^{+} &= \mathsf{bool} \\
(\tau \to \tau')^{+} &= \tau^{+} \to E^{o}\tau'^{+}
\end{aligned}$$

# Term translation ( $\Gamma \vdash e : \tau \rightsquigarrow E^{o}\tau^{+}$ )

$$\frac{}{\Gamma \vdash () : \mathsf{unit} \rightsquigarrow ()} \qquad \frac{}{\Gamma \vdash \mathsf{true} : \mathsf{bool} \rightsquigarrow \mathsf{true}} \qquad \frac{}{\Gamma \vdash \mathsf{false} : \mathsf{bool} \rightsquigarrow \mathsf{false}}$$

$$\frac{\Gamma \vdash e : \mathsf{bool} \rightsquigarrow e^{+} \quad \Gamma \vdash e_1 : \tau \rightsquigarrow e_1^{+} \quad \Gamma \vdash e_2 : \tau \rightsquigarrow e_2^{+}}{\Gamma \vdash \mathsf{if}\ e\ e_1\ e_2 : \tau \rightsquigarrow \mathsf{if}\ e^{+}\ e_1^{+}\ e_2^{+}}$$

$$\frac{\Gamma, x : \tau \vdash e : \tau' \rightsquigarrow e^{+}}{\Gamma \vdash \lambda x{:}\tau.e : \tau \to \tau' \rightsquigarrow \lambda x{:}\tau^{+}.\ e^{+} : E^{o}(\tau \to E^{o}\tau'^{+})}$$

$$\frac{\Gamma \vdash e_1 : \tau \to \tau' \rightsquigarrow e_1^{+} \qquad \Gamma \vdash e_2 : \tau \rightsquigarrow e_2^{+}}{\Gamma \vdash e_1\ e_2 : \tau' \rightsquigarrow \Gamma^{+} \vdash e_1^{+}\ e_2^{+} : E^{o}\tau'^{+}}$$

# Context translation ( $\Gamma, x : \tau \rightsquigarrow \Gamma, x : \tau$ )

$$\frac{}{\cdot \rightsquigarrow \cdot} \qquad \frac{}{\Gamma, x : \tau \rightsquigarrow \Gamma^{+}, x : \tau^{+}}$$