1.
$$\dfrac{\dfrac{\dfrac{\text{Int } 2}{\Gamma[x \triangleleft \text{Int}] \vdash 1 : \text{Int}}\ (\text{T-Int}) \qquad \dfrac{\text{Ident } x \quad \Gamma[x \triangleleft \text{Int}](x) = \text{Int}}{\Gamma[x \triangleleft \text{Int}] \vdash x : \text{Int}}\ (\text{T-Ident})}{\Gamma[x \triangleleft \text{Ident}] \vdash 2 + x : \text{Int}}\ (\text{T-Plus})}{\Gamma \vdash \text{lambda } x : \text{Int}.\ 2 + x : \text{Int} \to \text{Int}}\ (\text{T-Abs})$$

2.
$$\dfrac{\dfrac{\dfrac{\dfrac{\text{Ident } x \quad \Gamma[f \triangleleft \text{Int} \to \text{Int}][x \triangleleft \text{Int}](x) = \text{Int}}{\Gamma[f \triangleleft \text{Int} \to \text{Int}][x \triangleleft \text{Int}] \vdash x : \text{Int}}\ (\text{T-Ident}) \quad (\text{T-Abs})}{\Gamma[f \triangleleft \text{Int} \to \text{Int}] \vdash \text{lambda } x : \text{Int}.\ x : \text{Int} \to \text{Int}} \qquad \dfrac{\dfrac{\text{Ident } f \quad \Gamma[f \triangleleft \text{Int} \to \text{Int}](f) = \text{Int} \to \text{Int}}{\Gamma[f \triangleleft \text{Int} \to \text{Int}] \vdash f : \text{Int} \to \text{Int}}\ (\text{T-Ident}) \qquad \dfrac{\text{Int } 1}{\Gamma[f \triangleleft \text{Int} \to \text{Int}] \vdash 1 : \text{Int}}\ (\text{T-Int})}{\Gamma[f \triangleleft \text{Int} \to \text{Int}] \vdash \text{app } f\ 1 : \text{Int}}\ (\text{T-App})}{\Gamma \vdash \text{let } f : \text{Int} \to \text{Int} = \text{lambda } x : \text{Int}.\ x \text{ in app } f\ 1 : \text{Int}}\ (\text{T-Let})$$

3.
$$\{ X_1 = X_2 \to X_3,\ X_2 = X_3 \to X_4,\ X_3 = \text{Int} \}$$

$$[X_1 \mapsto (\text{Int} \to X_4) \to X_3,\ X_2 \mapsto \text{Int} \to X_4,\ X_3 \mapsto \text{Int}]$$

4.
$$\dfrac{\dfrac{\dfrac{\dfrac{\text{Ident } x \quad x \in \text{dom}(\Gamma[f \triangleleft X_1][x \triangleleft X_2])}{\Gamma[f \triangleleft X_1][x \triangleleft X_2](x) = X_2}\ (\text{CT-Ident1})}{\text{fresh } X_2 \quad \Gamma[f \triangleleft X_1][x \triangleleft X_2] \vdash x : X_2 \mid \{\}}\ (\text{CT-Abs})}{\text{fresh } X_1 \quad \Gamma[f \triangleleft X_1] \vdash \text{lambda } x.x : X_2 \to X_2 \mid \{\}} \qquad \dfrac{\dfrac{\dfrac{\text{Ident } f \quad f \in \text{dom}(\Gamma[f \triangleleft X_1])}{\Gamma[f \triangleleft X_1](f) = X_1}\ (\text{CT-Ident1}) \qquad \dfrac{\text{Int } 1}{\Gamma[f \triangleleft X_1] \vdash 1 : \text{Int} \mid \{\}}\ (\text{CT-Int})}{\text{fresh } X_3, X_4 \quad \Gamma[f \triangleleft X_1] \vdash f\ 1 : X_4 \mid \{X_1 = X_3 \to X_4,\ \text{Int} = X_3\}}\ (\text{CT-App})}{\Gamma[f \triangleleft X_1] \vdash \text{app } f\ 1 : X_4 \mid \{X_1 = X_3 \to X_4,\ \text{Int} = X_3,\ X_1 = X_2 \to X_2\}}\ (\text{CT-Let})$$
$$\Gamma \vdash \text{let } f = \text{lambda } x.x \text{ in app } f\ 2 : X_4 \mid \{X_1 = X_3 \to X_4,\ \text{Int} = X_3,\ X_1 = X_2 \to X_2\}$$

5.
$$[X_1 \mapsto \text{Int} \to \text{Int},\ X_2 \mapsto \text{Int},\ X_3 \mapsto \text{Int},\ X_4 \mapsto \text{Int}]$$