

I) $\lambda x:\text{Nat}. \text{zero}$

$$\begin{aligned}\llbracket \lambda x:\text{Nat}. \text{zero} \rrbracket_v &= V^{\llbracket \text{Nat} \rrbracket} \mapsto \llbracket \text{zero} \rrbracket_{v, x=Y} \\ &= V^{\llbracket \text{Nat} \rrbracket} \mapsto 0 \\ &= V^{\mathbb{N}} \mapsto 0\end{aligned}$$

II) $\lambda x:\text{Nat}. (\lambda y:\text{Nat}. y) \text{succ}(x)$

$$\begin{aligned}\llbracket \lambda x:\text{Nat}. (\lambda y:\text{Nat}. y) \text{succ}(x) \rrbracket_v &= X^{\llbracket \text{Nat} \rrbracket} \mapsto \llbracket (\lambda y:\text{Nat}. y) \text{succ}(x) \rrbracket_{v, x=X} \\ &= X^{\llbracket \text{Nat} \rrbracket} \mapsto \llbracket (\lambda y:\text{Nat}. y) \rrbracket_{v, x=X} \llbracket \text{succ}(x) \rrbracket_{v, x=X} \\ &= X^{\llbracket \text{Nat} \rrbracket} \mapsto \left(Y^{\llbracket \text{Nat} \rrbracket} \mapsto \llbracket y \rrbracket_{v, x=X, y=Y} \right) \llbracket x \rrbracket_{v, x=X+1} \\ &= X^{\mathbb{N}} \mapsto \left(Y^{\mathbb{N}} \mapsto Y \right) X+1 \\ &= X^{\mathbb{N}} \mapsto X+1\end{aligned}$$