opg. 1

$$\dfrac{\dfrac{}{\rho[x \mapsto t_x . f \mapsto t_x \to int] \mapsto 1 : int} \quad \dfrac{\rho \mapsto f : (\alpha \to int) \to int \qquad \rho \mapsto f : \alpha}{\rho[f \mapsto \forall \alpha . t_x \to int]} \; \alpha \text{ not free in } \rho}{\text{let f x = 1 in f f end}}$$

opg. 2

$$\dfrac{\dfrac{\dfrac{\rho \vdash \text{x<10:bool} \qquad \rho \vdash \text{42:int}}{\rho \vdash \text{x<10:bool}} \quad \dfrac{}{\rho \vdash \text{42:int}} \quad \dfrac{\dfrac{\text{p(f)}=V_a 1 ... an \cdot \text{ int}}{\rho \vdash \text{:int} \to t_r} \quad \dfrac{\rho \vdash \text{:int} \qquad \rho \vdash \text{1:int}}{\rho \vdash \text{x+1}:t_x}}{\rho \vdash \text{f(x+1)}:t_r}}{\rho[x \mapsto t_x, f \mapsto t_x \mapsto t_r] \vdash \text{if x < 10 then 42 else f(x+1)}} \quad \dfrac{\quad}{\rho}}{\text{let f x = if x < 10 then 42 else f(x+1) in f 20 en}}$$