

$$\begin{array}{c}
\begin{array}{c}
\rho(f) = \forall a; a \rightarrow \text{int} \\
\text{(p3)} \text{-----} \\
\rho \vdash f: [t_1 / a] a \rightarrow \text{int} = t_1 \rightarrow \text{int}
\end{array}
\quad
\begin{array}{c}
\rho(f) = \forall a; a \rightarrow \text{int} \\
\text{(p3)} \text{-----} \\
\rho \vdash f: [t_2 / a] a \rightarrow \text{int} = t_2 \rightarrow \text{int}
\end{array}
\end{array}$$

$$\begin{array}{c}
\text{(p1)} \text{-----} \quad \text{(p9)} \text{-----} \\
[x \rightarrow f_x, f \rightarrow f_x \rightarrow f_r] \vdash 1 : \text{int} \quad [f \rightarrow \forall a; a \rightarrow \text{int}] \vdash f f : \text{int} \\
\text{(p8)} \text{-----} \\
\text{let } f \ x = 1 \text{ in } f f
\end{array}$$

Polymorphism is something that happens usually in rule p8 in our environment, which we do in this case.

$$\begin{array}{c}
\begin{array}{c}
\rho(f) = \forall a; a \rightarrow \text{int} \\
\text{(p3)} \text{-----} \\
\rho \vdash f: [t_1/a] a \rightarrow \text{int} \rightarrow t_1 \rightarrow \text{int}
\end{array}
\end{array}$$

$$\begin{array}{c}
\begin{array}{c}
\text{(p1)} \text{-----} \quad \text{(p1)} \text{-----} \\
[] \vdash x : \text{int} \quad [] \vdash 10 : \text{int}
\end{array}
\quad
\begin{array}{c}
\text{(p1)} \text{-----} \\
[] \vdash 42 : \text{int}
\end{array}
\quad
\begin{array}{c}
\text{(p1)} \text{-----} \\
\rho \vdash (x+1) : \text{int}
\end{array}
\end{array}$$

$$\begin{array}{c}
\text{(p5)} \text{-----} \quad \text{(p1)} \text{-----} \quad \text{(p9)} \text{-----} \\
[] \vdash x < 10 : \text{bool} \quad [] \vdash 42 : \text{int} \quad [] \vdash f(x+1) : \text{int} \\
\text{(p7)} \text{-----} \\
\text{let } f \ x = \text{if } x < 10 \text{ then } 42 \text{ else } f(x+1) \text{ in } f \ 20
\end{array}$$

Since we do not utilize the p8 rule we do not mess around with the environment here. Thus we do not have polymorphism here.