Kevin Peters
kl1peter2

I'm pretty sure I fudged this up, but w/e I tried ☺

$\Gamma = \{x:int; id: \forall a.a \to a\}$

Variable Rule: $\{x:\alpha\} \vdash x : \alpha$

$\{\} \vdash fun\ x \to x : \alpha \to \alpha$

Variable Rule: $\Gamma \vdash x : int$ — Constant Rule: $\Gamma \vdash 0 : int$

$\Gamma \vdash (x > 0) : bool$

Variable Rule: $\Gamma \vdash id : int\ list \to int\ list$ — Constant Rule: $\Gamma \vdash [] : int\ list$

$\Gamma \vdash (id\ [\,]) : int\ list$

Constant Rule: $\Gamma \vdash (::) : int \to int\ list \to int\ list$

Variable Rule: $\Gamma \vdash id : int \to int$ — Variable Rule: $\Gamma \vdash x : int$

$\Gamma \vdash (id\ x) : int$

$\Gamma \vdash ((::)\ (id\ x)) : int\ list \to int\ list$

Variable Rule: $\Gamma \vdash [] : int\ list$

$\Gamma \vdash ((id\ x) :: []) : int\ list$

$\{x:int; \forall a.a \to a\} \vdash$ if $x > 0$ then $id\ []$ else $(id\ x) :: [] : int\ list$

$\{id: \forall a.a \to a\} \vdash fun\ x \to$ if $x > 0$ then $id\ []$ else $(id\ x) :: [] : int \to int\ list$

$\vdash$ let id = fun x → x

in fun x → if x > 0 then id[]

else (id x)::[] : int → int list