Lenguajes de Programación
Tarea III

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Problema I

$$\frac{\dfrac{\dfrac{\Gamma\ [x \leftarrow \text{number}], [\text{fib (number} \rightarrow \text{number})] \vdash \text{(- x 1)} : \text{number}\ \surd \quad \Gamma\ [x \leftarrow \text{number}], [\text{fib (number} \rightarrow \text{number})] \vdash \text{(- x 2)} : \text{number}\ \surd}{\Gamma\ [x \leftarrow \text{number}] \vdash x : \text{number}\ \Gamma\ [x \leftarrow \text{number}] \vdash 1 : \text{number}\ \surd \quad \Gamma\ [x \leftarrow \text{number}] \vdash \text{(fib (- x 1))} : \text{number} \quad \Gamma\ [x \leftarrow \text{number}] \vdash \text{(fib (- x 2))} : \text{number}} \quad \dfrac{\Gamma\ [x \leftarrow \text{number}] \vdash x : \text{number}\ \surd \quad \Gamma\ [x \leftarrow \text{number}] \vdash 0 : \text{number}\ \surd}{\Gamma\ [x \leftarrow \text{number}] \vdash \text{(= x 1)} : \text{bool}\ \Gamma\ [x \leftarrow \text{number}] \vdash 1 : \text{number}\ \surd \quad \Gamma\ [x \leftarrow \text{number}] \vdash \text{(+ (fib (- x 1)) (fib (- x 2)))} : \text{number}}}{\Gamma\ [x \leftarrow \text{number}] \vdash \text{(= x 0)} : \text{boolean} \quad \Gamma\ [x \leftarrow \text{number}] \vdash 0 : \text{number}\ \surd \quad \Gamma\ [x \leftarrow \text{number}] \vdash \text{(if (= x 1) 1 (+ (fib (- x 1) fib (- x 2))))} : \text{number}}$$

$$\frac{\Gamma\ [x \leftarrow \text{number}] \vdash \text{(if (= x 0) 0 (if (= x 1) 1 (+ (fib (- x 1) fib (- x 2)))))} : \text{number}}{\Gamma \vdash \text{fib (x : number)} : \text{number (if (= x 0) 0 (if (= x 1) 1 (+ (fib (- x 1) fib (- x 2)))))} : \text{(number} \rightarrow \text{number)} \quad \Gamma \vdash \text{empty?: (list} \rightarrow \text{bool)}\ \Gamma \vdash \text{l} : \text{list}\ \surd}{\Gamma \vdash \text{(empty? l)} : \text{bool}}$$

Problema II

$\boxed{1}$ (+ $\boxed{2}$ 1 $\boxed{3}$ (first $\boxed{4}$ (cons $\boxed{5}$ true $\boxed{6}$ empty)))

Retricciones

$[[\boxed{1}]]$ = number si $[[\boxed{2}]] = [[\boxed{3}]]$ = number
$[[\boxed{2}]]$ = number
$[[\boxed{3}]]$ = number si $[[\boxed{4}]]$ = nlist
$[[\boxed{4}]]$ = nlist si $[[\boxed{5}]]$ = number y $[[\boxed{6}]]$ = nlist
$[[\boxed{5}]]$ = number si $[[\boxed{5}]]$ contiene un numeral, pero $[[\boxed{5}]]$ = boolean!!
Por lo tanto esta mal formado el programa

Problema III

$\boxed{1}$ {fun {f : C1} : C2
$\boxed{2}$ {fun {x : C3} : C4
$\boxed{3}$ {fun {y : C5} : C6
{$\boxed{4}$ cons x $\boxed{5}$ {f $\boxed{6}$ {f y}}}}}}}

Acción	Stack	Sustitución
Inicio	$[[\boxed{1}]] = [[f]] \to [[\boxed{2}]]$ $[[\boxed{2}]] = [[x]] \to [[\boxed{3}]]$ $[[\boxed{3}]] = [[y]] \to [[\boxed{4}]]$ $[[cons]] = [[\boxed{x}]] \times [[\boxed{5}]] \to [[\boxed{4}]]$ $[[f]] = [[\boxed{6}]] \to [[\boxed{5}]]$ $[[f]] = [[y]] \to [[\boxed{6}]]$	Vacio
Paso 3	$[[\boxed{2}]] = [[x]] \to [[\boxed{3}]]$ $[[\boxed{3}]] = [[y]] \to [[\boxed{4}]]$ $[[cons]] = [[\boxed{x}]] \times [[\boxed{5}]] \to [[\boxed{4}]]$ $[[f]] = [[\boxed{6}]] \to [[\boxed{5}]]$ $[[f]] = [[y]] \to [[\boxed{6}]]$	$[[\boxed{1}]] \mapsto [[f]] \to [[\boxed{2}]]$
Paso 3	$[[\boxed{3}]] = [[y]] \to [[\boxed{4}]]$ $[[cons]] = [[\boxed{x}]] \times [[\boxed{5}]] \to [[\boxed{4}]]$ $[[f]] = [[\boxed{6}]] \to [[\boxed{5}]]$ $[[f]] = [[y]] \to [[\boxed{6}]]$	$[[\boxed{1}]] \mapsto [[f]] \to [[\boxed{2}]]$ $[[\boxed{2}]] \mapsto [[x]] \to [[\boxed{3}]]$
Paso 3	$[[cons]] = [[x]] \times [[\boxed{5}]] \to [[\boxed{4}]]$ = number $\times$ list $\to$ list $[[f]] = [[\boxed{6}]] \to [[\boxed{5}]]$ $[[f]] = [[y]] \to [[\boxed{6}]]$	$[[\boxed{1}]] \mapsto [[f]] \to [[x]] \to [[y]] \to [[\boxed{4}]]$ $[[\boxed{2}]] \mapsto [[x]] \to [[y]] \to [[\boxed{4}]]$ $[[\boxed{3}]] \mapsto [[y]] \to [[\boxed{4}]]$

Paso 5	[[x]] = number [[$\boxed{5}$]] = list [[$\boxed{4}$]] = list [[f]] = [[$\boxed{6}$]] → [[$\boxed{5}$]] [[f]] = [[y]] → [[$\boxed{6}$]]	[[$\boxed{1}$]] ↦ [[f]] → [[x]] → [[y]] → [[$\boxed{4}$]] [[$\boxed{2}$]] ↦ [[x]] → [[y]] → [[$\boxed{4}$]] [[$\boxed{3}$]] ↦ [[y]] → [[$\boxed{4}$]]
Paso 3	[[$\boxed{5}$]] = list [[$\boxed{4}$]] = list [[f]] = [[$\boxed{6}$]] → [[$\boxed{5}$]] [[f]] = [[y]] → [[$\boxed{6}$]]	[[$\boxed{1}$]] ↦ [[f]] → number → [[y]] → [[$\boxed{4}$]] [[$\boxed{2}$]] ↦ number → [[y]] → [[$\boxed{4}$]] [[$\boxed{3}$]] ↦ [[y]] → [[$\boxed{4}$]] [[x]] ↦ number
Paso 3	[[$\boxed{4}$]] = list [[f]] = [[$\boxed{6}$]] → list [[f]] = [[y]] → [[$\boxed{6}$]]	[[$\boxed{1}$]] ↦ [[f]] → number → [[y]] → [[$\boxed{4}$]] [[$\boxed{2}$]] ↦ number → [[y]] → [[$\boxed{4}$]] [[$\boxed{3}$]] ↦ [[y]] → [[$\boxed{4}$]] [[x]] ↦ number [[$\boxed{5}$]] ↦ list
Paso 4	[[f]] = [[$\boxed{6}$]] → list [[f]] = [[y]] → [[$\boxed{6}$]]	[[$\boxed{1}$]] ↦ [[f]] → number → [[y]] → list [[$\boxed{2}$]] ↦ number → [[y]] → list [[$\boxed{3}$]] ↦ [[y]] → list [[x]] ↦ number [[$\boxed{5}$]] ↦ list [[$\boxed{4}$]] ↦ list
Paso 3	[[$\boxed{6}$]] → list = [[y]] → [[$\boxed{6}$]]	[[$\boxed{1}$]] ↦ [[$\boxed{6}$]] → list → number → [[y]] → list [[$\boxed{2}$]] ↦ number → [[y]] → list [[$\boxed{3}$]] ↦ [[y]] → list [[x]] ↦ number [[$\boxed{5}$]] ↦ list [[$\boxed{4}$]] ↦ list [[f]] ↦ [[$\boxed{6}$]] → list
Paso 5	[[$\boxed{6}$]] = [[y]] list = [[$\boxed{6}$]]	[[$\boxed{1}$]] ↦ [[$\boxed{6}$]] → list → number → [[$\boxed{6}$]] → list [[$\boxed{2}$]] ↦ number → [[$\boxed{6}$]] → list

		[[3]] ↦ [[y]] → list [[x]] ↦ number [[5]] ↦ list [[4]] ↦ list [[f]] ↦ [[6]] → list
Paso 4	list = [[6]]	[[1]] ↦ [[6]] → list → number → [[6]] → list [[2]] ↦ number → [[6]] → list [[3]] ↦ [[6]] → list [[x]] ↦ number [[5]] ↦ list [[4]] ↦ list [[f]] ↦ [[6]] → list [[y]] ↦ [[6]]
Paso 4	Vacio	[[1]] ↦ list → number → list → list [[2]] ↦ number → list → list [[3]] ↦ list → list [[x]] ↦ number [[5]] ↦ list [[4]] ↦ list [[f]] ↦ list → list [[y]] ↦ list [[7]] ↦ list

Problema IV