Aula PL #03

3 de outubro de 2023 18:08

$$k = [f, g] : \begin{cases} k \cdot i_1 = f \\ k \cdot i_2 = g \end{cases} \quad (1)$$

$$[i_1, i_2] = id$$

(17) $\iff$ $\begin{cases} id \cdot i_1 = i_1 \\ id \cdot i_2 = i_2 \end{cases}$

(1) $\times 2$ $\iff$ $\begin{cases} id = i_1 \\ id = i_2 \end{cases}$

$\iff$ TRUE

(2) $[k, k] = k$

$\iff$ $\begin{cases} k \cdot i_1 = k \\ k \cdot i_2 = k \end{cases}$

$\iff$ $\begin{cases} k = k \\ k = k \end{cases}$

$\iff$ TRUE

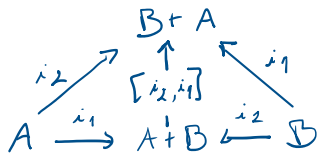
(3) $\text{coswap} = [i_2, i_1]$

$\text{coswap} \cdot \text{coswap} = id$

$[i_2, i_1] \cdot [i_2, i_1] = id$

$A \xrightarrow{i_1} A + \ldots$

$A \xrightarrow{i_2} \ldots + A$



$A + B \xrightarrow{\text{coswap}} B + A$

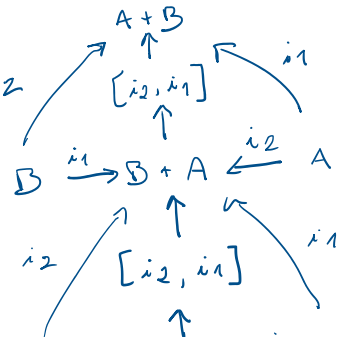
$\text{coswap} \cdot \text{coswap} = id$

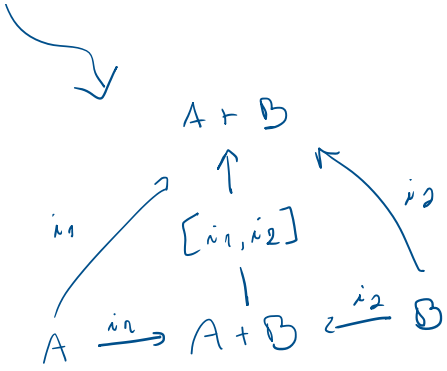
$\iff$ $\underbrace{[i_2, i_1] \cdot [i_2, i_1]}_{= k?} = id$

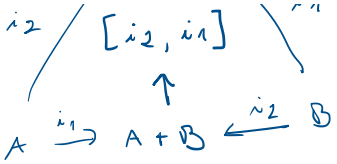
20 $\iff$ $[[i_2, i_1] \cdot i_2, [i_2, i_1] \cdot i_1] = id$

18 $\times 2$ $\iff$ $[i_1, i_2] = id$

(19) $\iff$ TRUE





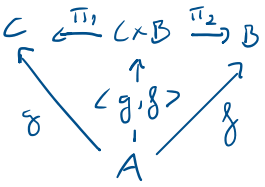


④ $[\langle False, id\rangle, \langle TRUE, id\rangle] = \alpha$

$A \xrightarrow{False} \mathbb{B}$

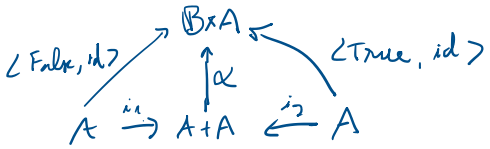
$A \xrightarrow{\langle False, Id\rangle} \mathbb{B}\times A$

$C \xrightarrow{\langle True, Id\rangle} \mathbb{B}\times C$



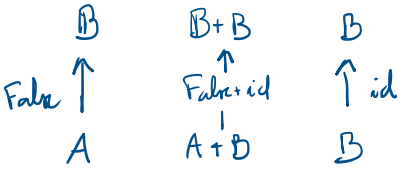
$\{\mathbb{B}\times A = \mathbb{B}\times C\}$

$A = C$



$A+A \longrightarrow \mathbb{B}\times A$

$$\begin{cases} \alpha \circ i_1 = \langle False, id\rangle \\ \alpha \circ i_2 = \langle True, id\rangle \end{cases}$$



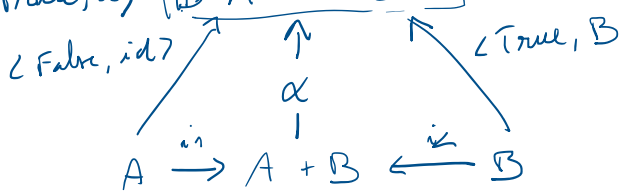
$$\begin{cases} \forall a \mid (\alpha \circ i_1)\, a = (False\ a, id\ a) \\ \forall a \mid (\alpha \circ i_2)\, a = (True\ a, id\ a) \end{cases}$$

$A+B \xrightarrow{False + id} \mathbb{B}+\mathbb{B}$

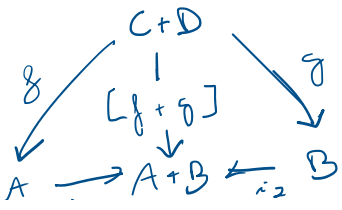
$A = \mathbb{B}\ (?)$

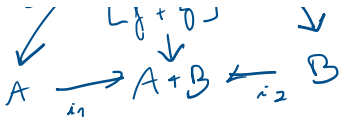
$$(\Leftarrow)\begin{cases} \forall a \mid \alpha \circ Left\ a = (False, a) \\ \forall a \mid \alpha \circ Right\ a = (True, a) \end{cases}$$

$\mathbb{B}\times A = \mathbb{B}\times\mathbb{B}$



⑤ $f + g = [i_1 \cdot f, i_2 \circ g]$





(7)

$$cl \cdot [id + i_1 , i_2 \cdot i_2] = id$$

$$\overset{20}{\Leftarrow} [cl \cdot (id + i_1), cl \cdot i_2 \cdot i_2] = id$$

$$\overset{17}{\Leftarrow} \begin{cases} cl \cdot (id + i_1) = i_1 \\ cl \cdot i_2 \cdot i_2 = i_1 \end{cases}$$

$$\overset{21}{\Leftarrow} \begin{cases} cl \cdot [i_1 \cdot id , i_2 \cdot id] = i_1 \\ \text{---------} \end{cases}$$

$$\overset{20}{\Leftarrow} \begin{cases} [cl \cdot i_1 \ \_ , cl \cdot i_2 \cdot i_1] = i_1 \\ \text{---------} \end{cases}$$

$$\Leftarrow \begin{cases} \begin{cases} cl \cdot i_1 = i_1 \cdot i_1 \\ cl \cdot i_2 \cdot i_1 = i_1 \cdot i_2 \\ cl \cdot i_2 \cdot i_2 = i_2 \end{cases} \\ \Downarrow \end{cases}$$

"Universal ao contrário"

$$\Leftrightarrow \begin{cases} cl \cdot i_1 = i_1 \cdot i_1 \\ cl \cdot i_2 = [i_1 \cdot i_2 , i_2] \end{cases} \quad \underline{17}$$

$$\Leftrightarrow cl = [i_1 \cdot i_1 , [i_1 \cdot i_2 , i_1]] \quad \underline{17}$$

Em HASKELL

$$\rightarrow \quad cl \cdot i_1 = i_1 \cdot i_1$$
$$cl \cdot i_2 \cdot i_1 = i_1 \cdot i_2$$
$$cl \cdot i_2 \cdot i_2 = i_2$$

$$\Leftrightarrow \begin{cases} cl\ (Left\ a) = Left\ (Left\ a) \\ cl\ Right\ (Left\ b) = Left\ (Right\ b) \\ [cl\ Right\ (Right\ c) = Right\ c] \end{cases}$$

EX.:

$(\_ , \_) : c \longrightarrow A + (B + C)$

EX.:

$(A+B)+C \longleftrightarrow A+(B+C)$

Right (em $(A+B)+C$) — Right (em $A+(B+C)$)

(8)

$$\begin{cases} fac\ 0 = 1 \\ fac\ (n+1) = (n+1) \times fac\ n \end{cases}$$

$\Leftarrow$

$$[fac \cdot [\underline{0}, succ] = [\underline{1}, mul \cdot \langle succ, fac \rangle]$$

Introduzir Variável a

$$[fac \cdot \underline{0}, fac \cdot succ] = \nearrow$$

$$\begin{cases} fac \cdot \underline{0} = \underline{1} \\ fac \cdot succ = mul \cdot \langle succ, fac \rangle \end{cases}$$

$$\begin{cases} \forall a \mid fac \cdot \underline{0}\ a = \underline{1}\ a \end{cases}$$

$\Leftarrow$

$$\begin{cases} \forall a \mid fac\ 0 = 1 \\ \forall a \mid fac \cdot succ\ a = (mul \cdot \langle succ, fac \rangle)\ a \end{cases}$$

$\Leftarrow$

$$\begin{cases} \forall a \mid fac \cdot succ\ a = mul\ (succ\ a, fac\ a) \\ \qquad\qquad\qquad\qquad\qquad\qquad = a+1 \end{cases}$$

$\Leftarrow$

$$\begin{cases} \forall a \mid fac\ 0 = 1 \\ \forall a \mid fac\ (a+1) = (a+1) \times fac\ a \end{cases}$$

(6)

$$\alpha = (id + \pi_1) \cdot i_2 \cdot \pi_2$$

$$A \times (B \times C) \xrightarrow{\pi_1} (B \times C)$$

$$\downarrow i_2$$

$$D + (B \times C)$$

$$\downarrow$$

$$id + \pi_1$$

$$\downarrow$$

$$D + B$$

⑨ $h\,x = \text{if } p\,x \text{ then } f\,x \text{ else } g\,x$

$p \to f, g = [f, g] \cdot p?$

$(p \to f, g) \cdot h = (p \cdot h) \to (f \cdot h), (g \cdot h)$

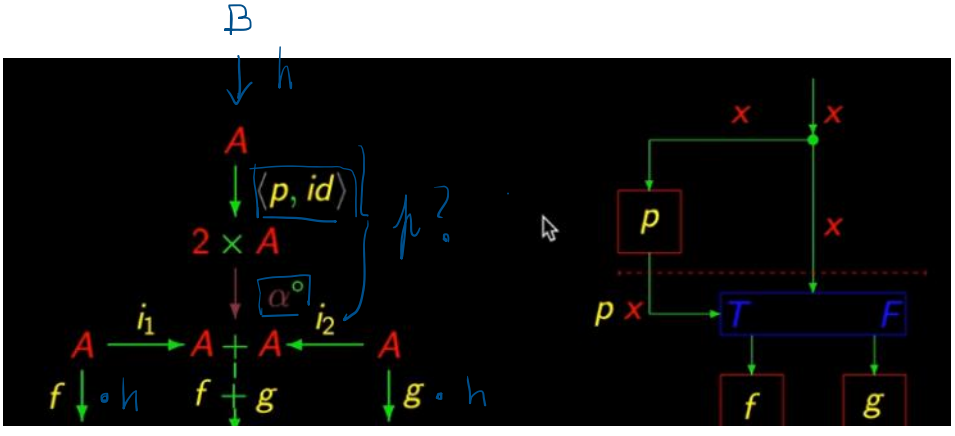
$(p \to f, g) \cdot h$

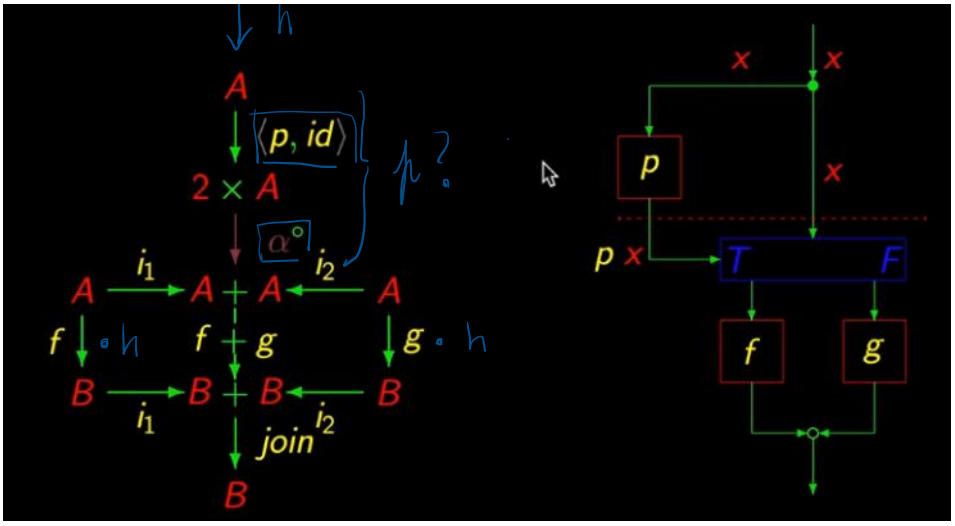
$= [f, g] \cdot p? \cdot h$

$= [f, g] \cdot (h + h) \cdot (p \cdot h)?$

$= [f \cdot h, g \cdot h] \cdot (p \cdot h)?$

$= (p \cdot h) \to f \cdot h, g \cdot h$





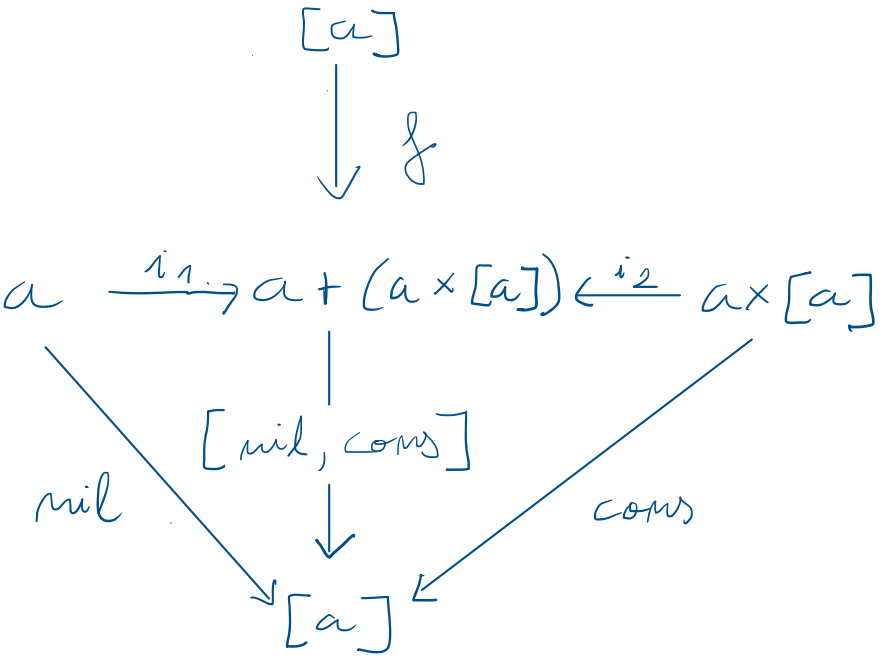
10. store c = take 10 . mub . cc :)

mub (Eq a) => [a] -> [a]

mub = [nil, cons] . g

nil _ = []

cons (h, t) = h : t



```haskell
module Ficha3 where

import Cp

store c = take 10 . nub' . (c:)

-- removes duplicates
myNub :: (Eq a) => [a] -> [a]
myNub [] = []
myNub (x:xs) = x : myNub (filter (/= x) xs)

nub' :: (Eq a) => [a] -> [a]
nub' = either nil cons . f

f :: (Eq a) => [a] -> Either [a] (a, [a])
f [] = Left []
f l@(x:xs) = Right (x, myNub (filter (/= x) xs))
```