Ficha 1 - Cálculo de Programas 2018/2019

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Conteúdo

1 Resoluções

1.1 Questão 1

Alínea *a*

Primeiro caso

$$(f \cdot g)x \equiv f(gx) \equiv f(x+1) \equiv 2 \times (x+1) \equiv 2 \times x + 2 \times 1 \equiv 2x \times 2$$

Segundo caso

$$(f \cdot g)x \equiv f(gx) \equiv f(2 \times x) \equiv succ(2x) \equiv 2x + 1$$

Terceiro caso

$$(f \cdot g)x \equiv f(g(x,y)) \equiv f(x+y) \equiv succ \cdot (\times 2)(x+y) \equiv (2 \times x + 2 \times y + 1)$$

1.2 Questão 2

Alínea *a*

$$myLength :: [a] \to Int$$
$$myLength = foldl\ (const \circ succ)\ 0$$

Alínea *b*

$$myReverse :: [a] \to [a]$$
$$myReverse\ [h] = [h]$$
$$myReverse\ l = [last\ l] +\!\!+ myReverse\ (init\ l)$$

1.3 Questão 3

$$myCatMaybes :: [Maybe\ a] \to [a]$$
$$myCatMaybes\ [\,] = [\,]$$
$$myCatMaybes\ (Nothing : xs) = catMaybes\ xs$$
$$myCatMaybes\ (Just\ b : xs) = b : catMaybes\ xs$$

1.4 Questão 4

Alínea *a*

$$myUncurry :: (a \to b \to c) \to (a, b) \to c$$
$$myUncurry\ f\ (x, y) = f\ x\ y$$

Alínea *b*

$$myCurry :: ((a, b) \to c) \to a \to b \to c$$
$$myCurry\ f\ x\ y = f\ (x, y)$$

Alínea *c*

$$myFlip :: (a \to b \to c) \to b \to a \to c$$
$$myFlip\ f\ x\ y = f\ y\ x$$

1.5 Questão 5

$$\textbf{data}\ LTree\ a = Leaf\ a \mid Fork\ (LTree\ a, LTree\ a)$$

Alínea *a*

$$flatten :: LTree\ a \to [a]$$
$$flatten\ (Leaf\ b) = [b]$$
$$flatten\ (Fork\ (e, d)) = flatten\ e +\!\!+ flatten\ d$$

Alínea *b*

$$mirror :: LTree\ a \to LTree\ a$$
$$mirror\ (Leaf\ b) = Leaf\ b$$
$$mirror\ (Fork\ (e, d)) = Fork\ (mirror\ d, mirror\ e)$$

Alínea *c*

$$myFmap :: (b \to a) \to LTree\ b \to LTree\ a$$
$$myFmap\ f\ (Leaf\ i) = Leaf\ (f\ i)$$
$$myFmap\ f\ (Fork\ (e, d)) = Fork\ (myFmap\ f\ e, myFmap\ f\ d)$$

1.6 Questão 6

$$newLength :: [a] \to Int$$
$$newLength = foldr\ (\lambda textbackslash\ l\ acc \to 1 + acc)\ 0$$