

Algoritmos y Estructuras de Datos I

Digesto de Funciones de Listas y Propiedades

Definiciones

1. Largo de una lista:

$$\left| \begin{array}{l} \# : [A] \rightarrow Num \\ \#[] \doteq 0 \\ \#(x \triangleright xs) \doteq \#xs + 1 \end{array} \right.$$

2. Indexar:

$$\left| \begin{array}{l} . : [A] \rightarrow Num \rightarrow A \\ (x \triangleright xs) . 0 \doteq x \\ (x \triangleright xs) . (n + 1) \doteq xs . n \end{array} \right.$$

3. Tirar:

$$\left| \begin{array}{l} \downarrow : [A] \rightarrow Num \rightarrow [A] \\ [] \downarrow n \doteq [] \\ (x \triangleright xs) \downarrow 0 \doteq x \triangleright xs \\ (x \triangleright xs) \downarrow (n + 1) \doteq xs \downarrow n \end{array} \right.$$

4. Tomar:

$$\left| \begin{array}{l} \uparrow : [A] \rightarrow Num \rightarrow [A] \\ [] \uparrow n \doteq [] \\ (x \triangleright xs) \uparrow 0 \doteq [] \\ (x \triangleright xs) \uparrow (n + 1) \doteq x \triangleright (xs \uparrow n) \end{array} \right.$$

5. Concatenar:

$$\left| \begin{array}{l} \# : [A] \rightarrow [A] \rightarrow [A] \\ [] \# ys \doteq ys \\ (x \triangleright xs) \# ys \doteq x \triangleright (xs \# ys) \end{array} \right.$$

6. Head (cabeza):

$$\left| \begin{array}{l} hd : [A] \rightarrow A \\ hd.(x \triangleright xs) \doteq x \end{array} \right.$$

7. Tail (cola):

$$\left| \begin{array}{l} tl : [A] \rightarrow [A] \\ tl.(x \triangleright xs) \doteq xs \end{array} \right.$$

Propiedades

1. Constructores de lista ($[]$, \triangleright):

$$\begin{aligned}x \triangleright xs &\neq [] \\(x \triangleright xs) = (y \triangleright ys) &\equiv x = y \wedge xs = ys\end{aligned}$$

2. Concatenación:

$$\begin{aligned}(xs \ ++ \ ys) = [] &\equiv xs = [] \wedge ys = [] \\(xs \ ++ \ ys) \ ++ \ zs &= xs \ ++ \ (ys \ ++ \ zs) \\(xs \ ++ \ ys).i &= (i < \#xs \rightarrow xs.i \\ &\quad \square i \geq \#xs \rightarrow ys.(i - \#xs) \\ &\quad)\end{aligned}$$

3. Longitud:

$$\begin{aligned}\#(xs \ ++ \ ys) &= \#xs + \#ys \\ \#(xs \uparrow n) &= n \text{ mín } \#xs \\ \#(xs \downarrow n) &= (\#xs - n) \text{ máx } 0\end{aligned}$$