Sequences , Bags , and Tuple Projection

Example 1 : Sequence Literals

(a)

Empty sequence

$\langle\rangle$

(b)

Single element

$\langle a \rangle$

(c)

Multiple elements

$\langle 1, 2, 3, 4, 5 \rangle$

(d)

Sequence of identifiers

$\langle x, y, z \rangle$

Example 2 : Sequence Operators

(a)

$head(\langle 1, 2, 3 \rangle)$

(b)

$tail(\langle 1, 2, 3 \rangle)$

(c)

$last(\langle 1, 2, 3 \rangle)$

(d)

$front(\langle 1, 2, 3 \rangle)$

(e)

$rev(\langle 1, 2, 3 \rangle)$

Example 3 : Sequence Concatenation

(a)

$\langle 1, 2 \rangle \frown \langle 3, 4 \rangle$

(b)

$s \frown t \frown u$

(c)

$\langle a \rangle \frown \langle b, c \rangle \frown \langle d \rangle$

Example 4 : Tuple Projection

(a)

$x.1$

(b)

$x.2$

(c)

$(a, b, c).1$

(d)

$(a, b, c).2$

Example 5 : Bag Literals

(a)

$[\![x]\!]$

(b)

$[\![1, 2, 3]\!]$

(c)

$[\![a, b, c]\!]$

(d)

Bags with duplicates

$[\![1, 2, 2, 3, 3, 3]\!]$

Example 6 : Sequences elem Expressions

(a)

$x \in \langle 1, 2, 3 \rangle$

(b)

$head(s) = a$

(c)

$tail(\langle 1, 2, 3 \rangle) = \langle 2, 3 \rangle$

Example 7 : Complex Expressions

(a)

$\forall\, i : \mathbb{N} \bullet i \in \langle 1, 2, 3 \rangle \Rightarrow i > 0$

(b)

$\exists\, s : \operatorname{seq} \mathbb{N} \bullet head(s) = 1$

(c)

$\{\, x : \mathbb{N} \mid x > 0 \bullet \langle x, x^2 \rangle \,\}$

Example 8 : Real Examples

(a)

From Solution 37

$\langle a \rangle$

(b)

Tuple projection from Solution 38

$trains(x).2$

(c)

Bags from Solution 39

$[\![d]\!]$