Funcons-beta: Multisets *

The PLanCompS Project

`Multisets.cbs` | PLAIN | PRETTY

Multisets (bags)

[*Type* multisets
Funcon multiset
Funcon multiset-elements
Funcon multiset-occurrences
Funcon multiset-insert
Funcon multiset-delete
Funcon is-submultiset]

Meta-variables GT <: ground-values

Built-in Type multisets(GT)

multisets(GT) is the type of possibly-empty finite multisets of elements of GT.

Built-in Funcon multiset(_ : (GT)*) : ⇒ multisets(GT)

Note that multiset($\cdots$) is not a constructor operation. The order of argument values is ignored, but duplicates are significant, e.g., multiset(1, 2, 2) is equivalent to multiset(2, 1, 2), but not to multiset(1, 2) or multiset(2, 1).

Built-in Funcon multiset-elements(_ : multisets(GT)) : ⇒(GT)*

For each multiset MS, the sequence of values V^* returned by multiset-elements(MS) contains each element of MS the same number of times as MS does. The order of the values in V^* is unspecified, and may vary between multisets.

Assert multiset(multiset-elements(S)) == S

Built-in Funcon multiset-occurrences(_ : GT, _ : multisets(GT)) : ⇒ natural-numbers

multiset-occurrences(GV, MS) returns the number of occurrences of GV in MS.

Built-in Funcon multiset-insert(_ : GT, _ : natural-numbers, _ : multisets(GT)) : ⇒ multisets(GT)

*Suggestions for improvement: `plancomps@gmail.com`.
Reports of issues: `https://github.com/plancomps/CBS-beta/issues`.

multiset-insert(GV, N, MS) returns the multiset that differs from MS by containing N more copies of GV.

Built-in Funcon multiset-delete(_ : multisets(GT), _ : GT, _ : natural-numbers) : $\Rightarrow$ multisets(GT)

multiset-delete(MS, GV, N) removes N copies of V from the multiset MS, or all copies of GV if there are fewer than N in MS.

Built-in Funcon is-submultiset(_ : multisets(GT), _ : multisets(GT)) : $\Rightarrow$ booleans

is-submultiset(MS_1, MS_2) tests whether every element of MS_1 has equal or fewer occurrences in MS_1 than in MS_2.