Bags (Multisets)

Example 1 : Bag Type

Bags are unordered collections that allow duplicates:

bag $\mathbb{N}$
bag $\mathbb{Z}$

Example 2 : Bag Literals

Bags are written with double square brackets:

$[\![x]\!]$
$[\![a, b, c]\!]$
$[\![1, 2, 2, 3, 3, 3]\!]$

Example 3 : Bags vs Sets

Unlike sets, bags preserve multiplicity:

The bag [[1, 2, 2, 3]] is different from the set $\{1, 2, 3\}$

The bag [[a, a, a]] contains three copies of a

Example 4 : Bags elem Specifications

Bags can model collections where order doesn't matter but quantity does:

$coins \in \text{bag } Coin$
$items \in \text{bag } Item$