Event B Exercises 8
Summing of various collections

The objective of this tutorial is to explore the specification of various version *Sum* for different forms of collections.

Consider the following collections (aggregates):

set: an aggregate to which only *membership* applies;

sequence: an aggregate that primarily models ordering, but can allow multiple instances of the same value;

bag: an aggregate that models multiplicity

For this tutorial:

1. Set is modelled by a finite subset of $\mathbb{N}$;
2. Seq is modelled by a finite function from $\mathbb{N} \pfun \mathbb{N}$ where the domain of a sequence s is $1 \ldots card(s)$;
3. Bag is modelled by a finite function from $\mathbb{N} \pfun \mathbb{N}$.

Let's define 3 different *sums* defined as follows:

Set sum: $\sum_{i \in s} i$ = sum of all the elements of the set s;

Seq sum: $\sum_{i \in \mathrm{dom}(s)} s(i)$ = sum of all the elements of the sequence s;

Bag sum: $\sum_{i \in \mathrm{dom}(s)} i * b(i)$ = sum the product of each element in the bag multiplied by the number of instances of that element in the bag, sometimes called the *frequency*.