

### 0.0.1 Map

The *map* operation takes in a function  $fn?$ , Collection  $coll?$  and additional Arguments  $args?$  (as necessary) and returns a modified Collection  $coll!$  with members  $fn!_n$ . The ordering of  $coll?$  is maintained within  $coll!$

$$\begin{array}{l}
 \text{Map}[(\_ \rightarrow \_), \text{Collection}, V] \text{-----} \\
 \text{fn?} : (\_ \rightarrow \_) \\
 \text{args?} : V \\
 \text{coll?}, \text{coll!} : \text{Collection} \\
 \text{map\_} : (\_ \rightarrow \_) \times \text{Collection} \times V \rightarrow \text{Collection} \\
 \hline
 \text{coll!} = \text{map}(\text{fn?}, \text{coll?}, \text{args?}) \bullet \\
 \quad \langle \forall n : i..j \in \text{coll?} \mid i \leq n \leq j \wedge j = \# \text{coll?} \bullet \\
 \quad \quad \exists_1 \text{fn!}_n : V \mid \text{fn!}_n = \\
 \quad \quad \quad (\text{fn?}(\text{coll?}_n, \text{args?}) \iff \text{args?} \neq \emptyset) \vee \\
 \quad \quad \quad (\text{fn?}(\text{coll?}_n) \iff \text{args?} = \emptyset) \rangle \Rightarrow \text{fn!}_i \cap \text{fn!}_n \cap \text{fn!}_j
 \end{array}$$

Above,  $fn!_n$  is introduced to handle the case where  $fn?$  only requires a single argument. Additional arguments may be necessary but if they are not ( $args? = \emptyset$ ) then only  $coll?_n$  is passed to  $fn?$ .

$$\begin{array}{ll}
 X = \langle 1, 2, 3 \rangle & \\
 \text{map}(\text{succ}, X) = \langle 2, 3, 4 \rangle & [\text{increment each member of } X] \\
 \text{map}(+, X, 2) = \langle 3, 4, 5 \rangle & [\text{add 2 to each member of } X]
 \end{array}$$