MODULE *Utils*

This module has general utilities most of them are from the community modules.

https://*github.com*/tlaplus/*CommunityModules*/blob/master/modules/*SequencesExt.tla*

LOCAL INSTANCE *Sequences*
LOCAL INSTANCE *Naturals*
LOCAL INSTANCE *FiniteSets*

Given a set of numbers, returns the maximum number.

$Max(S) \triangleq \text{CHOOSE } x \in S : \forall\, y \in S : x \geq y$

A function is injective iff it maps each element in its domain to a distinct element.

This definition is overridden by *TLC* in the *Java* class *Functions.java* The operator is overridden by the *Java* method with the same name.

$IsInjective(f) \triangleq \forall\, a,\, b \in \text{DOMAIN } f : f[a] = f[b] \Rightarrow a = b$

$ToSet(s) \triangleq$

The image of the given sequence s. $Cardinality(ToSet(s)) \leq Len(s)$ see https://*en.wikipedia.org*/wiki/*Image_(mathematics)*

$\{s[i] : i \in \text{DOMAIN } s\}$

$SetToSeq(S) \triangleq$

Convert a set to some sequence that contains all the elements of the set exactly once, and contains no other elements.

$\text{CHOOSE } f \in [1 \,..\, Cardinality(S) \to S] : IsInjective(f)$

$Reverse(s) \triangleq$

Reverse the given sequence s: Let l be $Len(s)$ (length of s). Equals a sequence $s.t.$ $\langle S[l], S[l-1], \ldots, S[1] \rangle$

$[i \in 1 \,..\, Len(s) \mapsto s[(Len(s) - i) + 1]]$

$Remove(s,\, e) \triangleq$

The sequence s with e removed or s iff $e \notin Range(s)$

$SelectSeq(s, \text{ LAMBDA } t : t \neq e)$