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- MODULE SetUtils
Copyright: https://www.learntla.com/libraries/sets/
EXTENDS TLC
LOCAL INSTANCE Naturals
Pick an element from the set S.
Pick(S) \stackrel{\triangle}{=} CHOOSE \ s \in S : TRUE
Pick an element that is not in the set S.
PickNone(S) \stackrel{\triangle}{=} CHOOSE \ s : s \notin S
RECURSIVE SetReduce(_, _, _)
SetReduce(Op(\_, \_), S, value) \stackrel{\triangle}{=}
    IF S = \{\}
     THEN value
     ELSE LET s \stackrel{\triangle}{=} Pick(S)
             IN SetReduce(Op, S \setminus \{s\}, Op(s, value))
This version will report an error if the operation applied is not commutative as required.
RECURSIVE SetReduceSafe(_, _, _)
SetReduceSafe(Op(\_, \_), S, value) \stackrel{\Delta}{=}
    IF S = \{\}
     Then value
     ELSE LET s \stackrel{\triangle}{=} Pick(S)
             IN IF Op(s, value) = Op(value, s)
                    THEN SetReduceSafe(Op, S \setminus \{s\}, Op(s, value))
                    ELSE Assert(FALSE, "Op is not commutative.")
Sum(S) \triangleq
      LET sum(a, b) \triangleq a + b
      IN SetReduce(sum, S, 0)
IsMin(set, min) \triangleq
     \land min \in set
     \land (\forall x \in set : min \leq x)
IsMax(set, max) \triangleq
     \land max \in set
     \land (\forall x \in set : max \ge x)
MinOfSet(set) \triangleq CHOOSE \ min \in set : (\forall x \in set : min \leq x)
MaxOfSet(set) \stackrel{\triangle}{=} CHOOSE \ max \in set : (\forall x \in set : max \ge x)
\* Modification History
* Last modified Tue Dec 04 19:43:16 CST 2018 by anonymous
* Created Fri Jul 06 13:21:26 CST 2018 by anonymous
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