

Decidability.

Let our domain be the set of natural numbers.

- ① Suppose that membership in each of S_1 and S_2 is decidable. Show that membership in $S_1 \cup S_2$ is decidable.

To show that a problem is decidable, we need to give an algorithm to solve it. Here is an algorithm to determine membership in $S_1 \cup S_2$.

(or decide)

Given a natural number x , check whether x is in S_1 .

If $x \in S_1$, return yes (x is in $S_1 \cup S_2$).

If $x \notin S_1$, check whether x is in S_2 .

If $x \in S_2$, return yes. Otherwise, return no.

(We can decide whether x is in S_1 and x is in S_2 because membership in each of S_1 and S_2 is decidable.)