

## $\mu$ -Challenge 1: Tricky Termination

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Consider the following recursively defined function:

$$\begin{aligned} f & : \mathbb{P} V \rightarrow \mathbb{N} \rightarrow V \\ f S i & \hat{=} \text{ if } \nu(i) \in S \text{ then } f S (i + 1) \text{ else } \nu(i) \end{aligned}$$

where  $\nu : \mathbb{N} \rightarrow V$  is an injective function.

1. Prove that  $f$  terminates<sup>1</sup>, if  $S$  is finite.
2. Function  $f$  also terminates if  $S$  is infinite, but satisfying some condition. What is that condition?
3. What is the function for, anyway?

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<sup>1</sup>The trick is finding the well-founded relation.