

# Diagonalization argument

We prove  $\mathbb{P}(\mathbb{N})$  is uncountable using a diagonalization argument.

Consider the infinite matrix representing  $\mathbb{P}(\mathbb{N})$ .

By construction, every subset of  $\mathbb{N}$  is represented by some row in the matrix.

Consider the set  $Y$  defined by  $j \in Y$  if and only if  $M_{j,j} = 0$ .

Note that  $Y$  is a subset of  $\mathbb{N}$ .