Two Awesome Countable Sets!

Do some examples on your own to get a feel for what these objects actually look like

(pdfs Mackey sent out are a great resource)

Think about what exactly these sets contain — are they numbers or tuples?

Countable Union of countable sets

$\bigcup_{i \in \mathbb{N}} C_i$

each set being unioned is countable

$i \in \mathbb{N}$: any countable union

$$\bigcup_{i \in \mathbb{N}} C_i = C_0 \cup C_1 \cup C_2 \cup \dots$$

... goes off

countably infinite

Finite Cartesian Product of countable sets

$\prod_{i \in [n]} C_i$

each set in the product is countable

$i \in [n]$: *but only a finite number of times!

$$\prod_{i \in [n]} C_i = C_1 \times C_2 \times C_3 \times \dots \times C_n$$

stops because finite