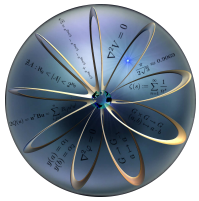

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numerable set

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Let X be a set. An *enumeration* on X is a surjection from the set of natural numbers $\mathbb{N}$ to X.

A set X is called *numerable* if there is a bijective enumeration on X.

It is easy to show that $\mathbb{Z}$ and $\mathbb{Q}$ are numerable.

It is a standard fact that $\mathbb{R}$ is not numerable. For, if we suppose that the numbers [0,1] were countable, we can arrange them in a list (given by the supposed bijection).

Representing them in a binary form, it is not hard to construct an element in [0,1], which is not in the list.

This contradiction implies that $[0,1] \subset \mathbb{R}$ is not numerable.

Remark. If the enumeration $\mathbb{N} \to X$ is furthermore a computable function, then we say that X is *enumerable*. There exists numerable sets that are not enumerable.