Complement

Links: Math 3336

Lecture Video 13: Complement; Textbook Section 1.6

Given a set, *S*, its complement is notated by $\bar{S}$ (or S^C)
$\bar{S} = \{x : x \notin S\}$

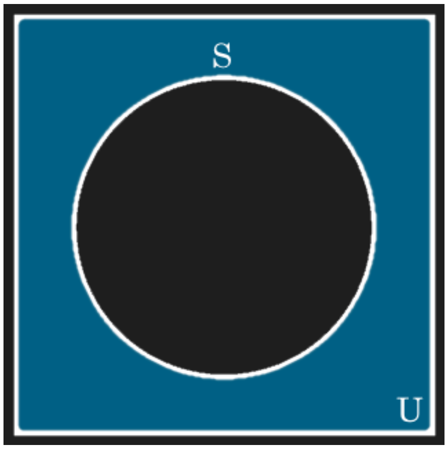
The idea of the complement is too big to make sense of, there are too many things not in a set!

> To properly define and use "set complement" we first need to specify a big set containing out starting set *S*.

this "big set" is the "universe of discourse" or the *universal set* denoted as U.

what is $\overline{\mathbb{N}}$ using $U = \mathbb{Z}$?
$\overline{\mathbb{N}} = \{x \in \mathbb{Z} : x \notin \mathbb{N}\} = U - \mathbb{N}$
"the set of elements x in integers such that x is not in the naturals" = "the universal set takeaway the naturals (the set we're complementing)"

thus $\overline{\mathbb{N}} = \mathbb{Z} - \mathbb{N} = \{\ldots, -5, -4, -3, -2, -1, 0\}$

Visualization of $\overline{S} = U - S$:


The universal set is not always specified, many times it is understood from context.
union, *intersection*, and *complement* interact with each other, they can also be combined with the cartesian product and the power sets.