$A = \{X : X \text{ is a set and } X \notin X\}$ Russell's trick

$\{\{1,2\}, \{1,3\}\}$ example

$\mathbb{Z} \in A$ because $\mathbb{Z} \notin \mathbb{Z}$ $\quad \mathbb{Z} = \{\ldots -3, -2, -1, 0, \ldots\}$

$\emptyset \in A$ because $\emptyset \notin \emptyset$

⋮

Is $A \in A$?

If $A \in A$ ... hmmm... elements of A are those sets that aren't elements of A.

If $A \notin A$, ... hmmm. Then $A \in A$ because elements of A are exactly the sets that aren't elements of themselves.

PARADOX

Frege ↝ Zermelo Frankel axioms of set theory.

Foundations of Mathematics