Philosophy 152: Computability & Logic

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1. Frege: *Grundlagen der Arithmetic*, 1880s

2. Cantor: Infinite set theory, 1880s.

3. Russell's Paradox: $S = \{x : x \notin x\}$.

4. Russell and Whitehead: *Principia Mathematica*.

5. Zermelo and ZF set theory.

6. Goal of foundations of mathematics: A consistent, formal system that proves all true statements of mathematics.

7. Hilbert: Hilbert's Program. (including: a finitary proof of consistency)

Theorem 1 *(Gödel's First Incompleteness Theorem)* For any sufficiently strong (Peano?) consistent formal system, there is a true statement that is not provable.

Theorem 2 *(Gödel's Second Incompleteness Theorem)* No sufficiently strong consistent formal system can prove its own consistency.