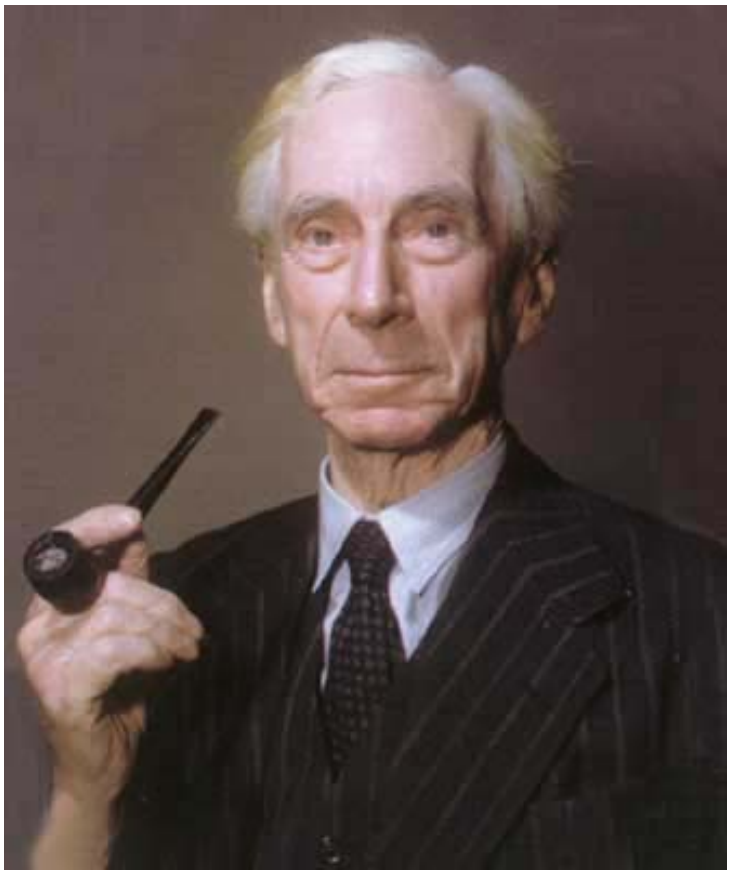
# Bertrand Russell (1872-1970)

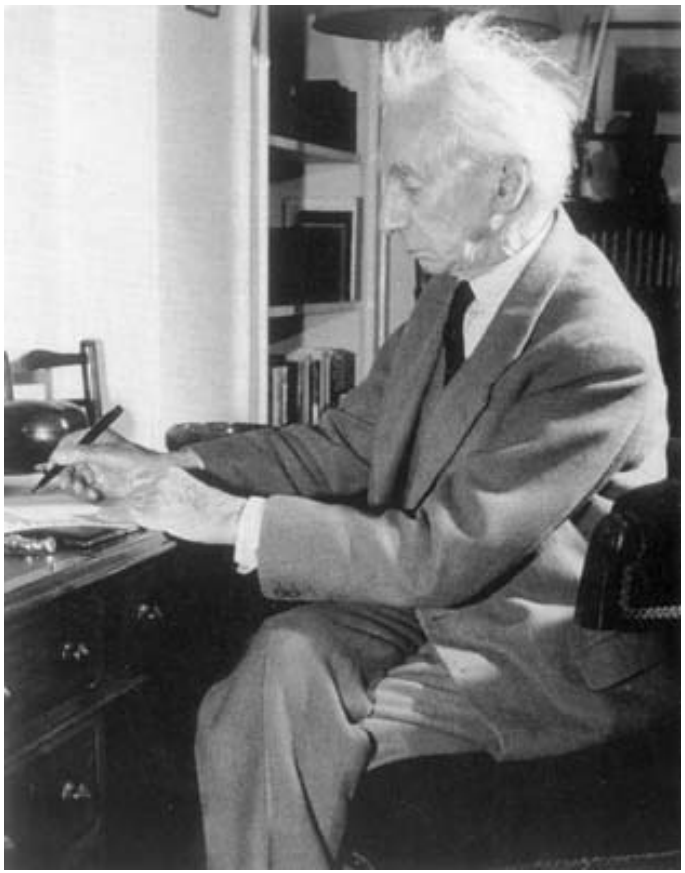


- Philosopher
- Mathematician
- Political Activist

# Frege's Influence

- 'Mathematics is reducible to logic alone'
- Russell's paradox
  - Basic Law V is inconsistent
- "the sole possible foundations of arithmetic seem to vanish" (Frege)
- Russell takes up the mantle of Logicism

# The Theory of Types



- Hierarchical definition
  - People (individuals) are type 0
  - Teams (classes of individuals) are type 1
  - Leagues (classes of type 1 classes) are type 2
  - And so on

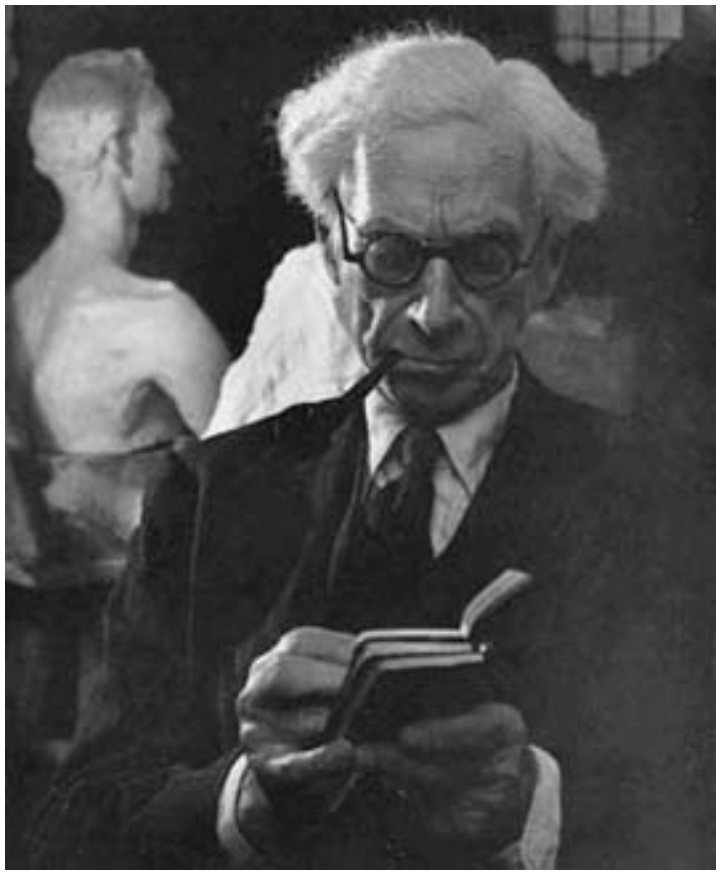
# Defining Numbers

- natural numbers are classes of classes
  - ‘1’ is the class of all type 1 classes of exactly one individual
- integers are relations on natural numbers
- rational numbers are ratios of integers
- real numbers are classes of rational numbers
- complex numbers are ordered pairs of real numbers

# Unfortunately Necessary

- Axiom of Infinity
  - There are infinitely many individuals
- Axiom of Reducibility
  - Every class is equivalent to a predicative class
- Axiom of Choice
  - For any collection of distinct non-empty classes, there is a class containing exactly one member from each class in the collection

# On Postulating



The method of "postulating" what we want has many advantages;

they are the same as the advantages of theft over honest toil.

# Questions for Discussion

- Does the Axiom of Reducibility simply ‘dodge’ the issue of impredicative definitions?
- Does the theory cover geometry as well as arithmetic? What about other branches of mathematics?
- What are modern Russellians up to?