Today

- Reminder: sections start today - sign up on Coursework!
- Remarks about the readings and quizzes
- Finishing up Mind, Body, and World
- Logic and Machines
- Tips on *Gödel's Proof*

Quiz 1

Pick up outside 460-040 (keep folders neat)

Answer key posted on course website
http://www.stanford.edu/class/symbsys100

Average score: 11.1

Distribution:

score:	0	4	8	12	16	20
% of class:	4%	5%	26%	40%	21%	4%

Remarks on the quizzes

Don’t panic - let yourself learn

A bit of psychology: Dweck’s entity verus incremental theorists - be the latter

How I grade

Quizzing at the right level

How to study

- Do the reading well once (highlighting, margin writing or light notetaking) - 4 or 5 hours per class session
- Go to class and take notes
- Take quiz - compare answers to key and sources
- Go to section - ask questions
- Review notes and highlights before midterm and final
- Pose questions on and follow the discussion list
- Go to office hours if you need more help

Materialism III: Eliminativism

mental states don’t exist

analogies

witches

phlogiston

elan vital

spirit diseases

Failures of folk psychology

introspectionism

experiments

split brains

Differ from reductionism?

gamma synchrony

DLPFC (Dorsolateral Prefrontal Cortex)

Mind and world (rough outline)

Monism - opposite of dualism

- Idealism

  dreams, other minds - experience is all there is

- Materialism

  matter is all there is

Realism

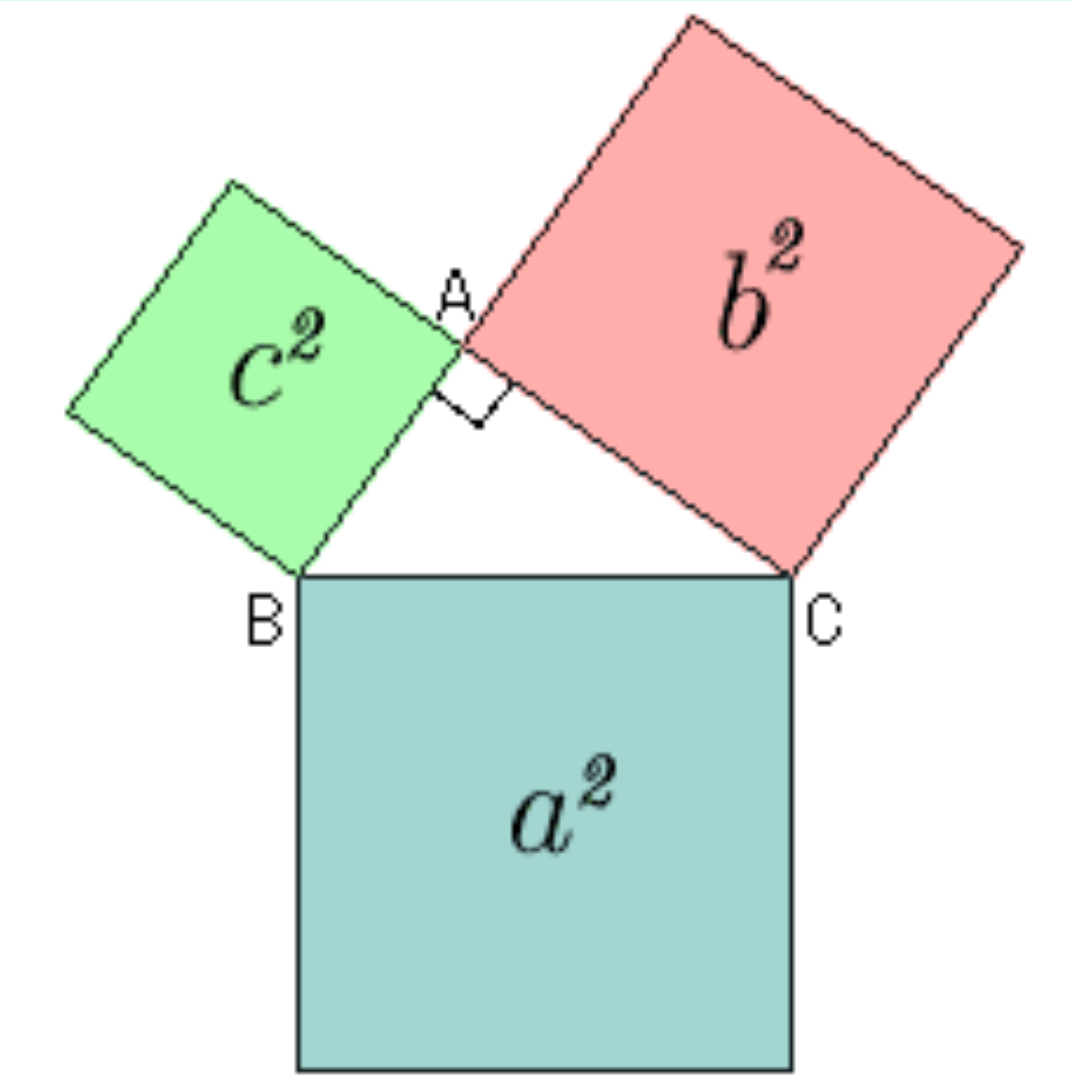
"God is no deceiver" - the world we see is real

Transcendental Idealism

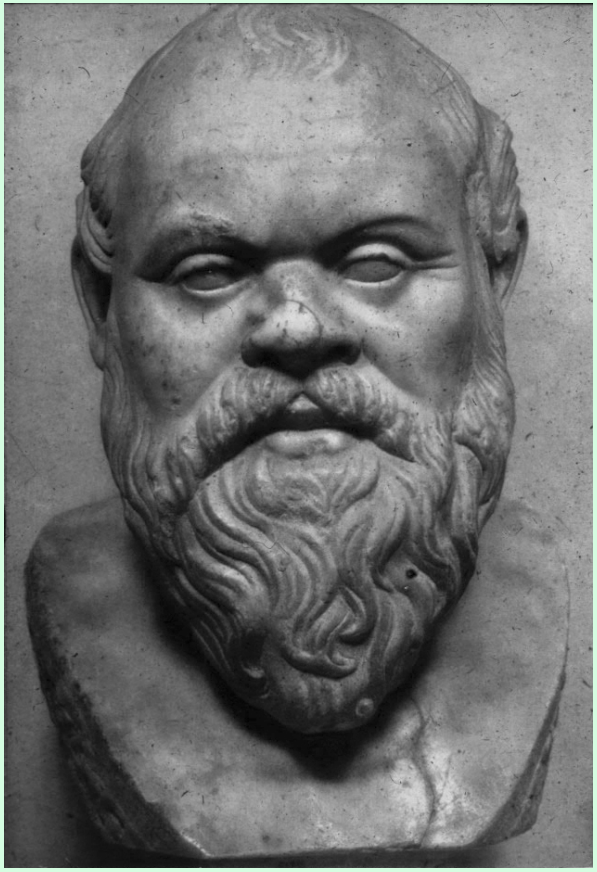
Kant's view - a synthesis

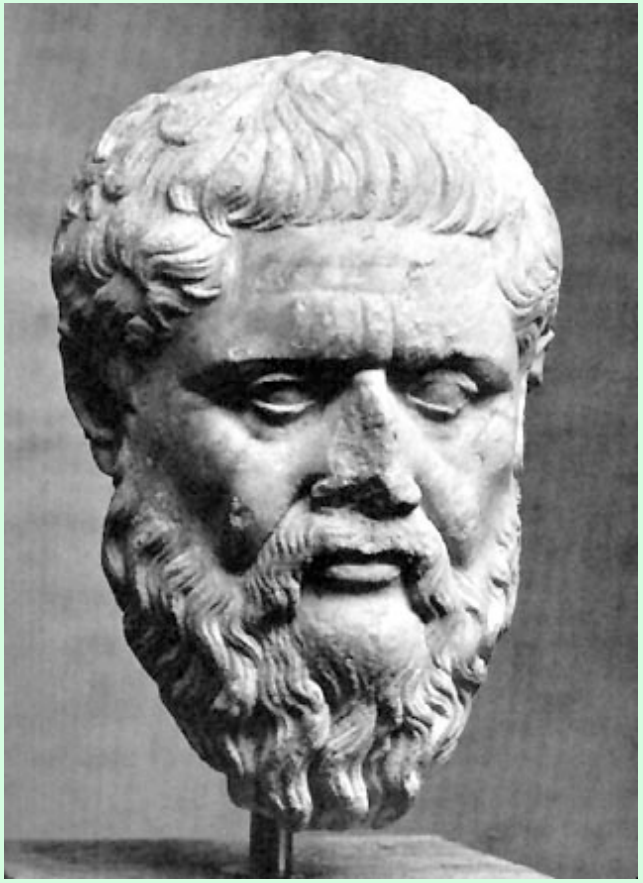
Logic and Machines:
A Brief History

“Pythagoras” (6th Century BCE)

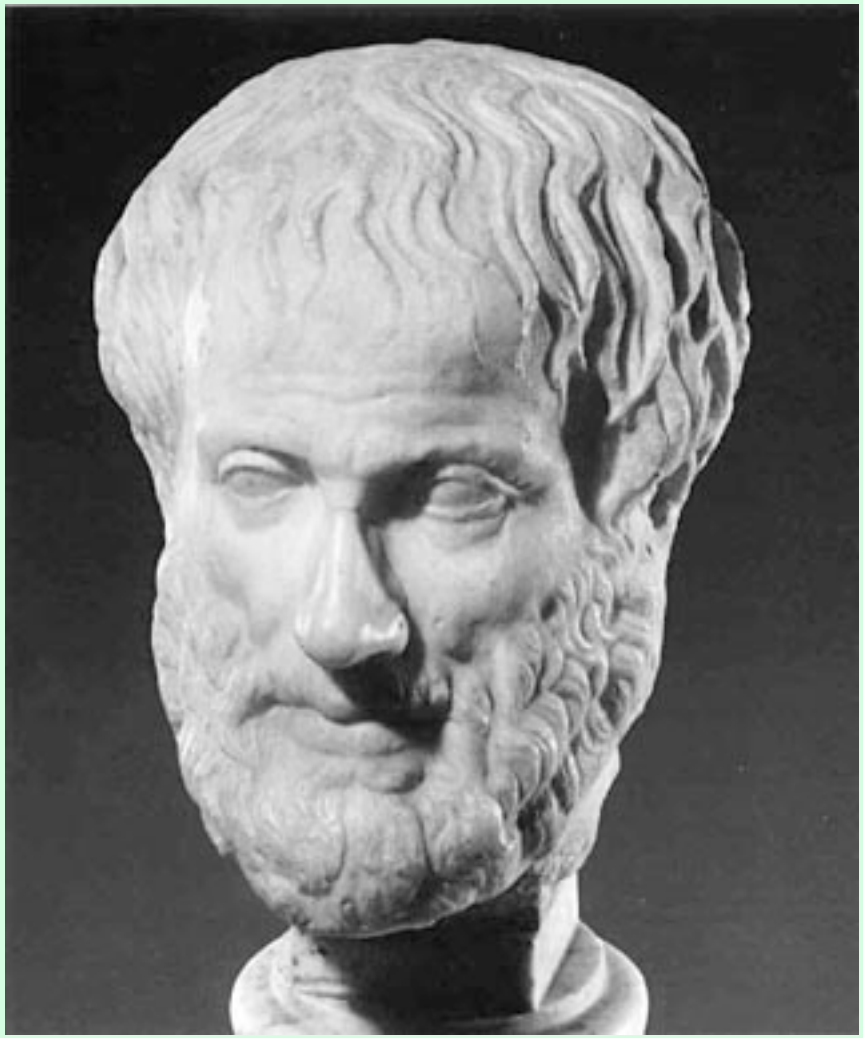


Socrates and Plato (5th/4th Centuries BCE)





Aristotle (4th Century BCE)



Syllogisms

All X are Y

All Y are Z

Therefore All X are Z

Some Y are X

All Y are Z

Therefore Some X are Z

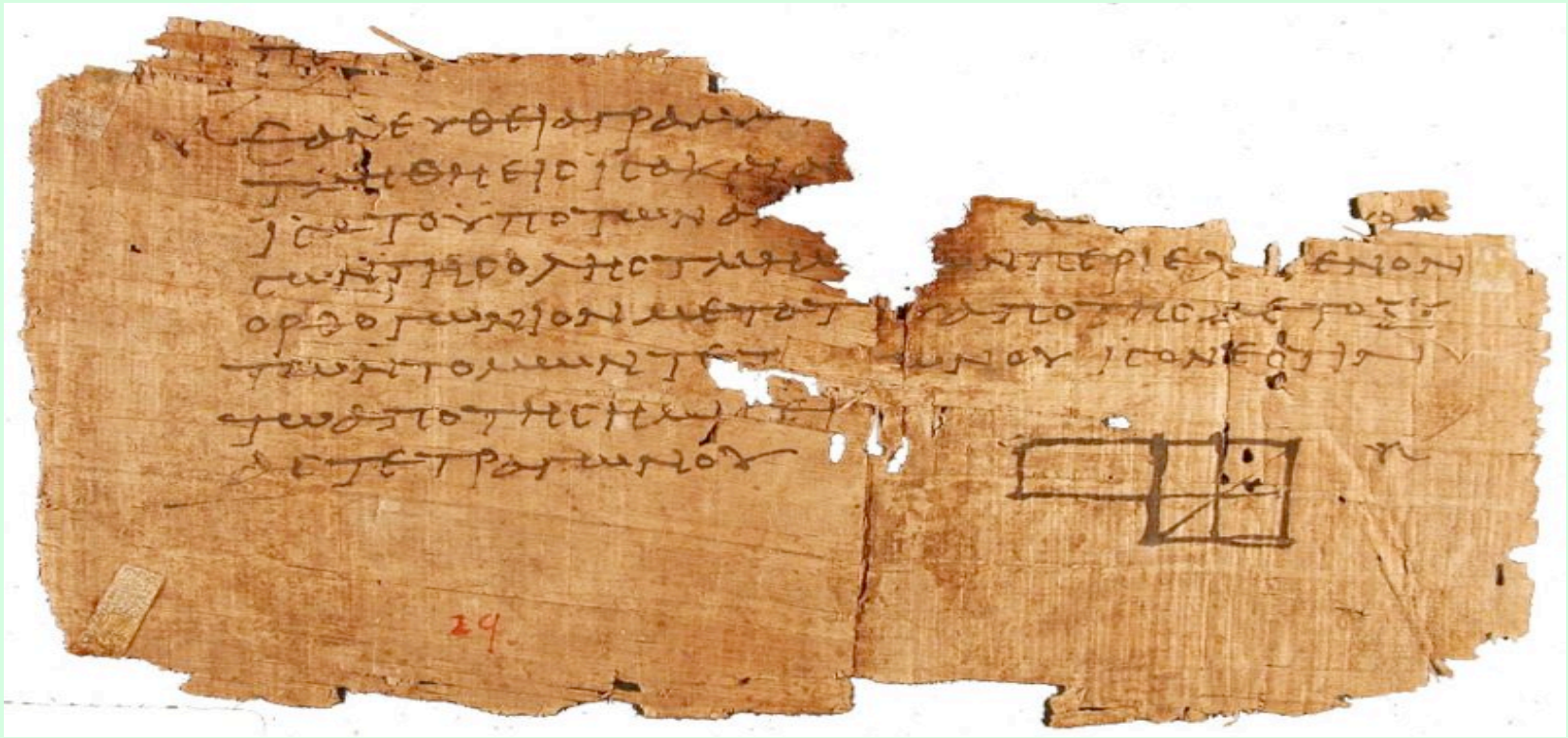
No X are Y

All Y are Z

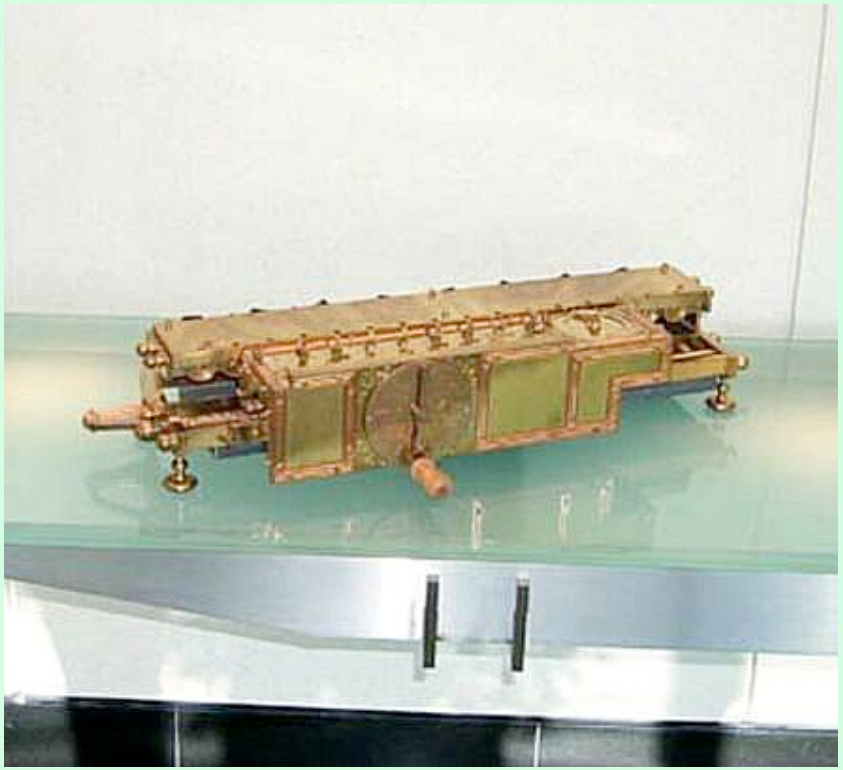
Therefore, No X are Z?

Therefore Some Z are not X?

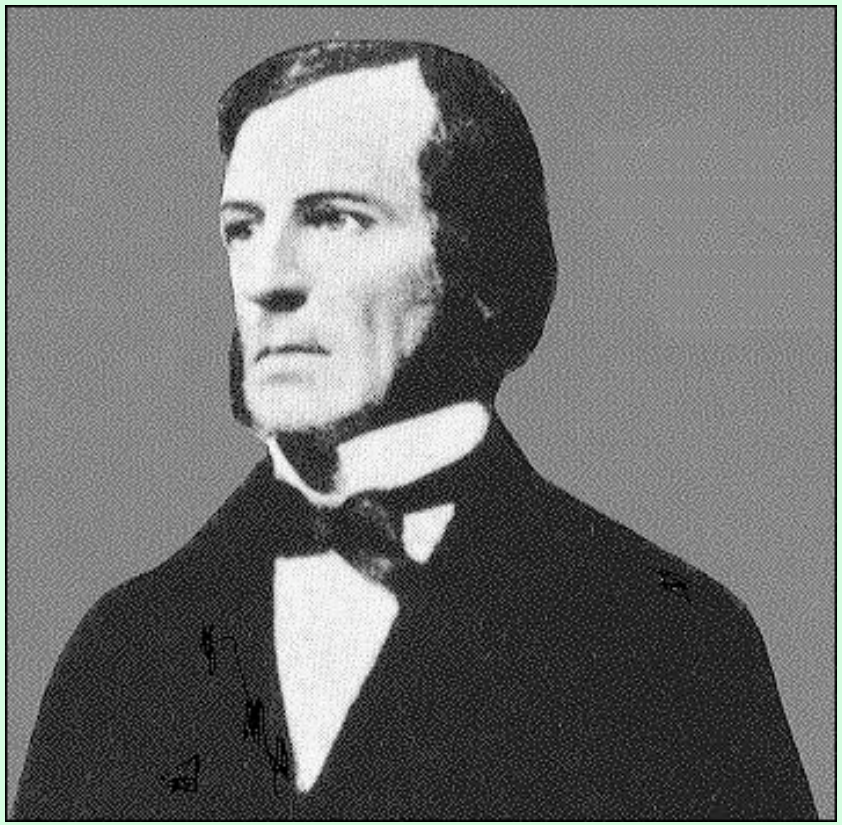
Euclid's *Elements* (3rd Centuries BCE)



Leibniz (1646-1716)



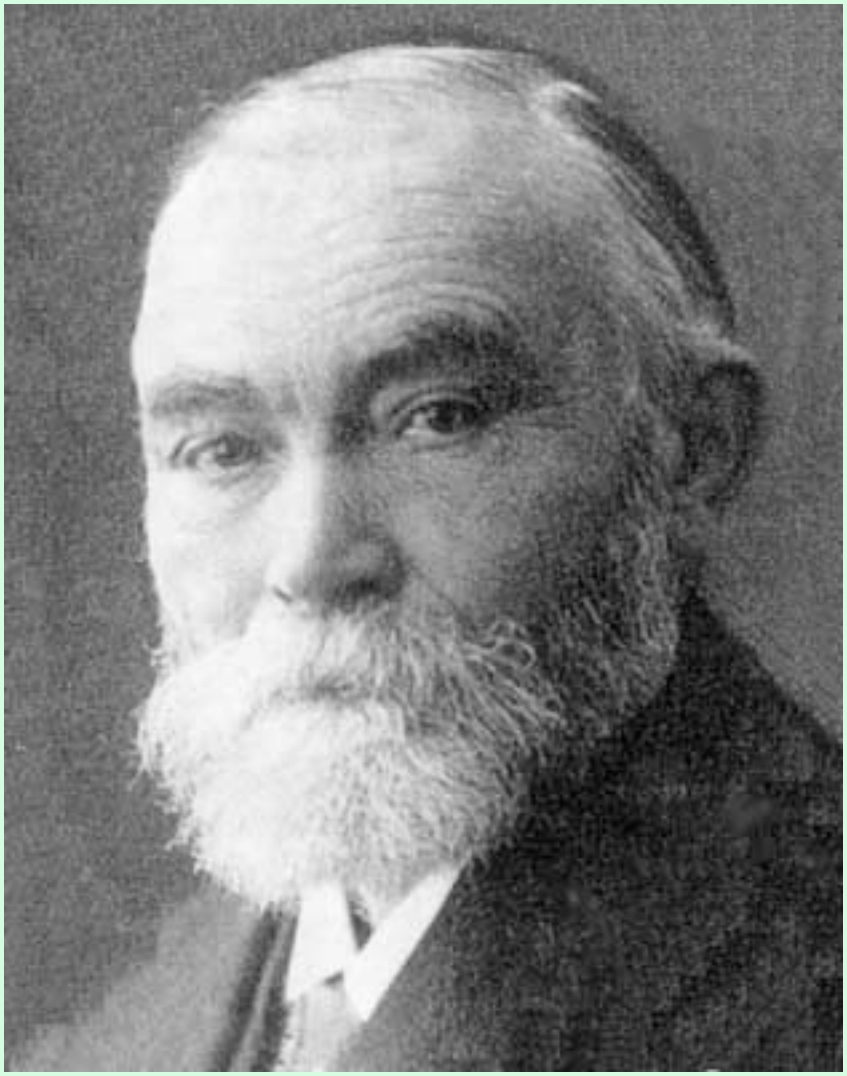
Boole (1815-1864)



Propositional Logic

1.	Law of Identity	$A = A$ $\overline{A} = \overline{A}$
2.	Commutative Law	$A \cdot B = B \cdot A$ $A + B = B + A$
3.	Associative Law	$A \cdot (B \cdot C) = A \cdot B \cdot C$ $A + (B + C) = A + B + C$
4.	Idempotent Law	$A \cdot A = A$ $A + A = A$
5.	Double Negative Law	$\overline{\overline{A}} = A$
6.	Complementary Law	$A \cdot \overline{A} = 0$ $A + \overline{A} = 1$
7.	Law of Intersection	$A \cdot 1 = A$ $A \cdot 0 = 0$
8.	Law of Union	$A + 1 = 1$ $A + 0 = A$
9.	DeMorgan's Theorem	$\overline{AB} = \overline{A} + \overline{B}$ $\overline{A + B} = \overline{A}\,\overline{B}$
10.	Distributive Law	$A \cdot (B + C) = (A \cdot B) + (A \cdot C)$ $A + (BC) = (A + B) \cdot (A + C)$
11.	Law of Absorption	$A \cdot (A + B) = A$ $A + (AB) = A$
12.	Law of Common Identities	$A \cdot (\overline{A} + B) = AB$ $A + (\overline{A}B) = A + B$

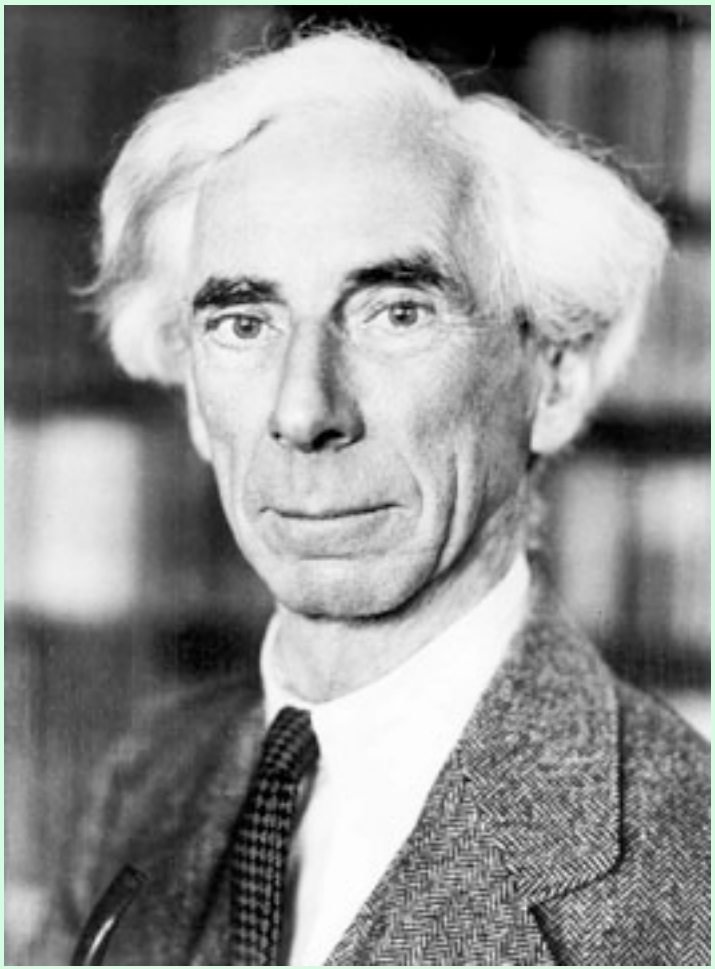
Frege (1848-1925)



Predicate Logic/First Order Logic

1.	$(\exists x)\text{Tet}(x)$	premise (i.e. $\in \Sigma$)
2.	$(\forall x)(\text{Tet}(x) \rightarrow \text{Large}(x))$	premise (i.e. $\in \Sigma$)
3.	$((\forall x)(\text{Tet}(x) \rightarrow \text{Large}(x)) \rightarrow (\text{Tet}(x) \rightarrow \text{Large}(x))$	Q1: 2
4.	$\text{Tet}(x) \rightarrow \text{Large}(x)$	prop cons: 2,3
5.	$\text{Large}(x) \rightarrow (\exists x)\text{Large}(x)$	Q2: 4
6.	$\text{Tet}(x) \rightarrow (\exists x)\text{Large}(x)$	prop cons: 4,5
7.	$(\exists x)\text{Tet}(x) \rightarrow (\exists x)\text{Large}(x)$	QR$\exists$: 6
8.	$(\exists x)\text{Large}(x)$	prop cons: 1, 7

Bertrand Russell (1872-1970)



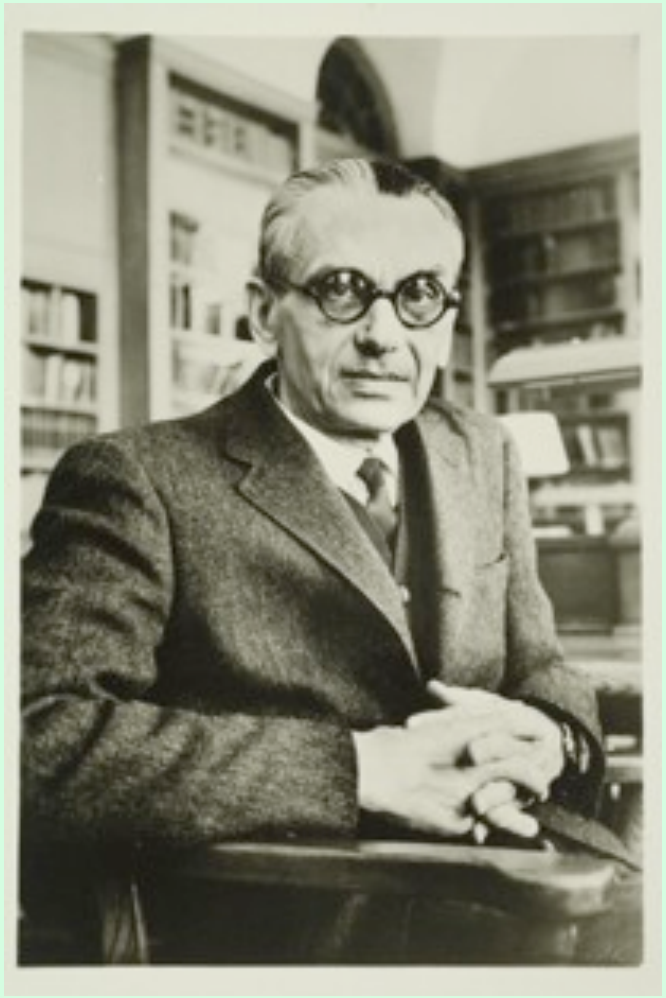
Russell paradox

Showed Frege's project was flawed

Principia Mathematica (with Whitehead)

Attempt to construct mathematics in logic

Kurt Gödel (1906-1978)



Showed that no system such as that of *Principia Mathematica* could be sufficient for proving all of mathematics

Alan Turing (1912-1954)

Showed that a universal device could be constructed for performing any computation*

Showed that no algorithm could solve the decision problem for first order logic