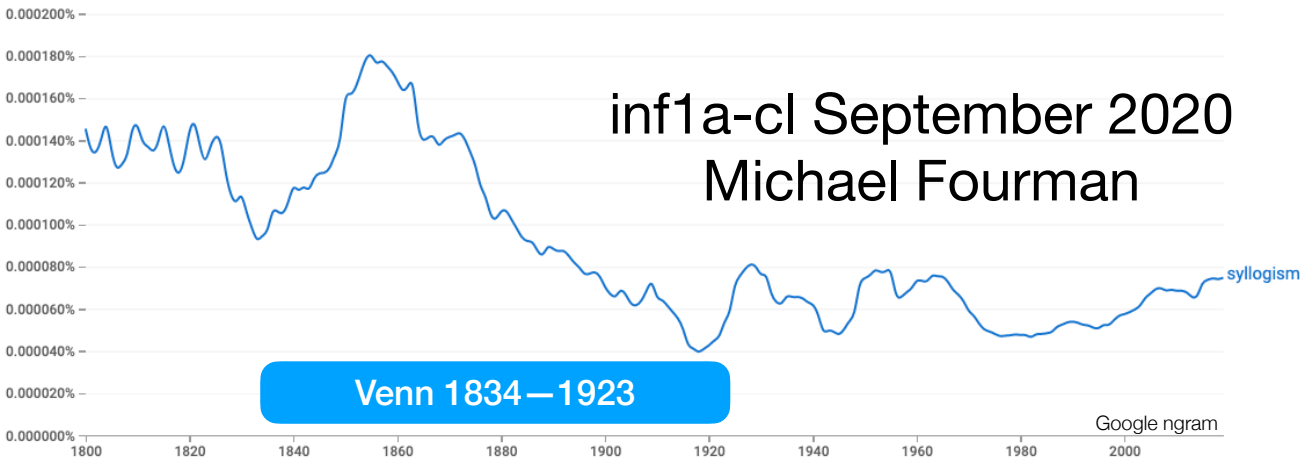
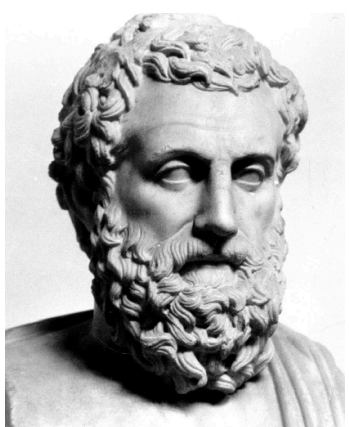


inf1a-cl September 2020
Michael Fourman

INF1A

Aristotle
to Venn

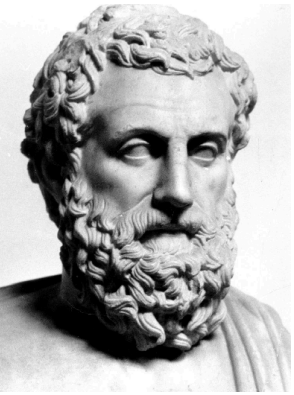
Aristotle's *universal* propositions



Aristotle
384-322 BC

$$\frac{s \models r \qquad r \models \neg f}{s \models \neg f}$$

All snakes are reptiles.
No reptile has fur.
∴ No snake has fur.



Aristotle

Aristotle's propositions relate two predicates.
His simplest type of proposition,
universal affirmation, corresponds to
every a is b or all a are b
for example,
All men are mortal and Socrates is a man

INF1A

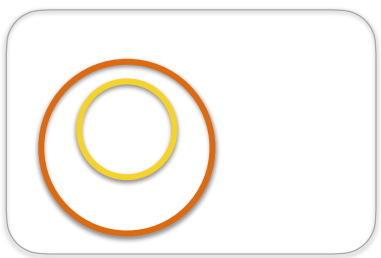
universals

Euler
1707-1783

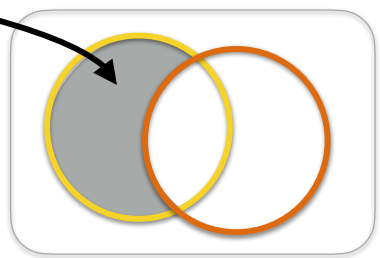
all **a** is **b**
every **a** is **b**

$$a \models b$$

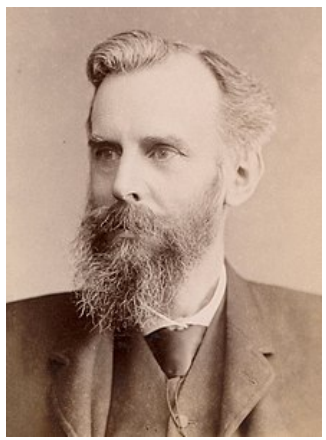
a and not **b**,
is empty:
no counterexample



Euler diagram

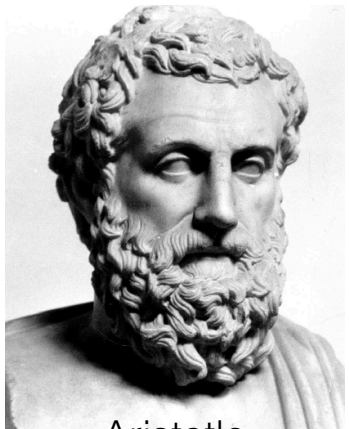


Venn diagram

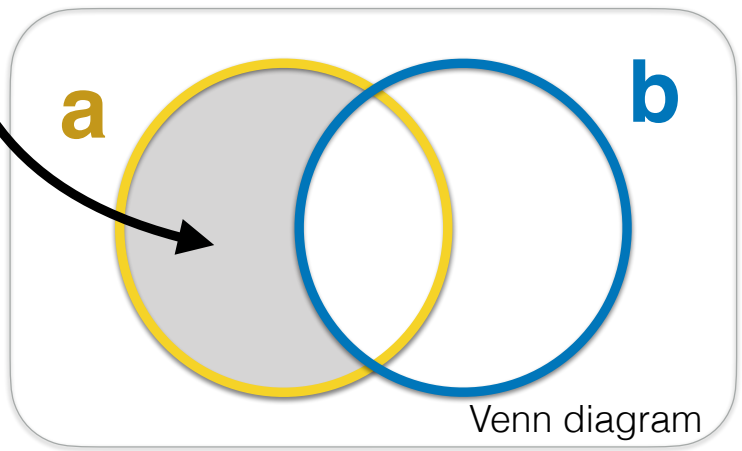


Venn
1834-1923

the proposition, *all **a** is **b***
*is valid **in this universe**, if there is*
no counterexample:
this region is empty



Aristotle
384-322 BC



Venn diagram

INF1A

valid
proposition

$$a \models b$$

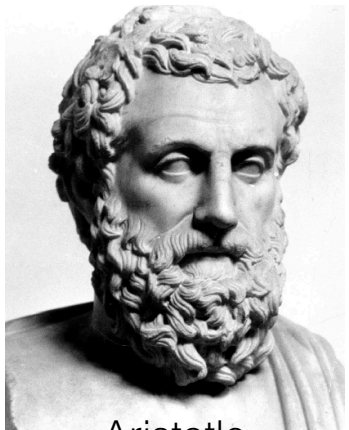
$$\{x \mid a\ x\} \subseteq \{x \mid b\ x\}$$

the proposition, *no **a** is **b***

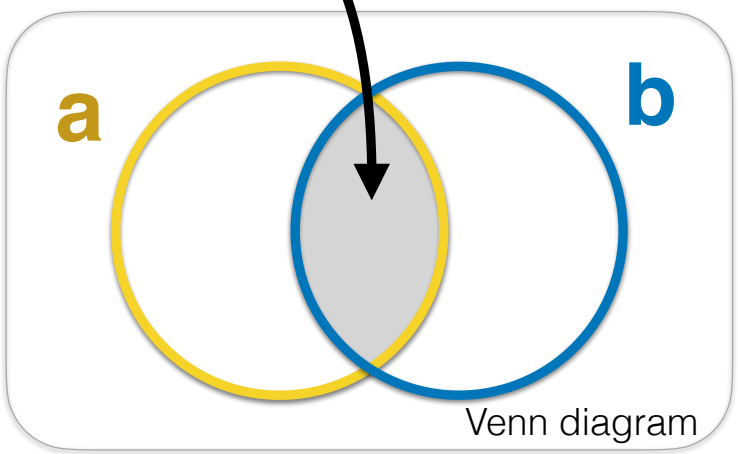
is valid if *all **a** is **not** **b***

no counterexample

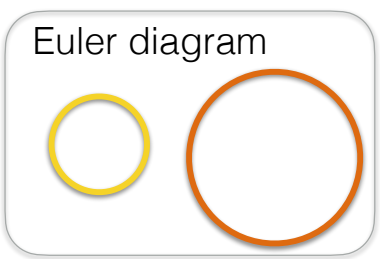
this region is empty



Aristotle
384-322 BC



Venn diagram



INF1A

valid
proposition

$$a \models \neg b$$

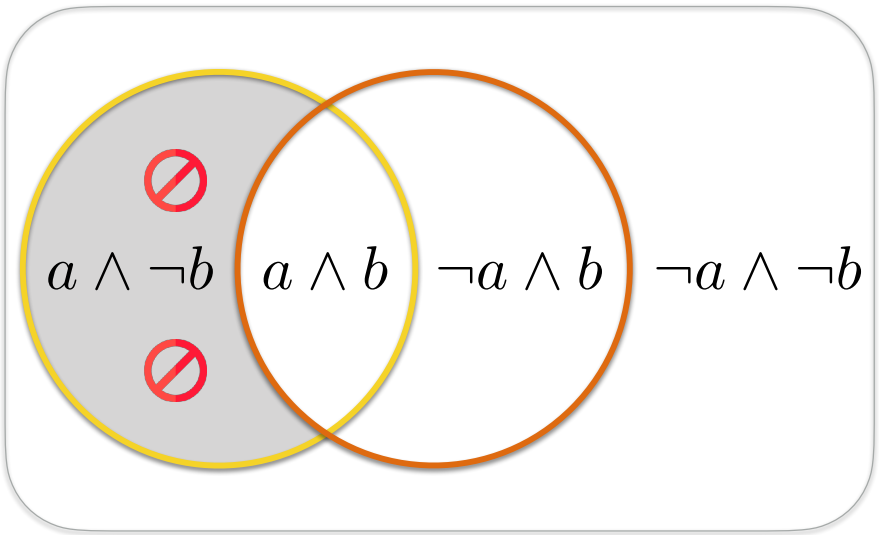
$$\{x \mid a\ x\} \subseteq \{x \mid \neg b\ x\}$$

INF1A

denial

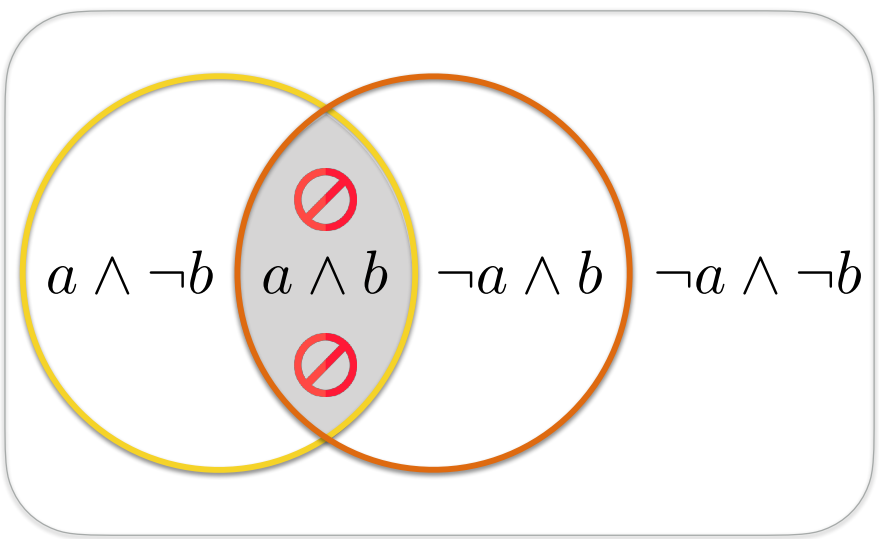
universal affirmation

$a \models b$ every **a** is **b**



universal denial

$a \models \neg b$ no **a** is **b**



$a \models b$ iff no individual is a and not b

$a \models \neg b$ iff no individual is a and not not b

$a \models \neg b$ iff no individual is a and b