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What is logic?

↳ reasoning

(deducing some facts from some previously known facts.)

History & Paradoxes

1. Liar Paradox

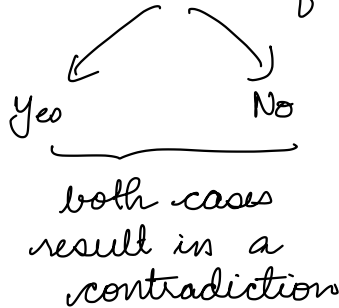
'This sentence is not true'.

↳ Can not assign a truth value

Neither true nor not true

2. "In a village, there is a barber who shaves exactly those people who do not shave themselves."

→ Does the barber shave himself?



There can be no such barber

In response to these 'paradoxes'

- ↳ A foundation of mathematics was developed
 - > Formal Language
 - > Set Theory
 - > Logical Principles

Frege

- > acceptable foundⁿ of reasoning
- > many tradⁿ questions could be answered

eg.

consistency of ZF.

↳

proved by godel.

any sufficiently rich mathematical theory can not prove its own consistency.

logic flourished in first half of this century.

Why do we need to study logic?

→ Automation

↳ proving theorems using computers

Formalization of reasoning is necessary if one wants to use computers for it
(precise is nature)

→ In CS we want to reason about things like programs / algorithms / computation and models of computation

In order to do human or formal reasoning, we need to specify these systems and properties

We can use insights obtained from development in mathematical logic, to construct such formal logic and reasoning principle.

eg: Temporal logic.