First - order Logic (FOL):

* First - order Logic (FOL) also called predicate Logic (or) First order predicate Logic (FOPL) is an extension of propositional Logic.

which only deals with simple true / false statements.

Components:

1) constants

Represent specific objects in a domain.

EX: John, Apple, 2, Earth.

2) variables

Represent arbitrary objects

EX, X, Y, Z.

3) predicates (Relations)

Describe properties of object 6r)
relationships blw them

Human (John) -> John is a human

4) Functions.
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A function takes inputs and

Produces one output.

Ex : Father (John) = David

(David is John's father),

5) Logical connectives.

AND (∧)

(Or) (∨)

Not (¬)

implies (->)

It and only if (<->).

6 > Quantifiers

Quantifiers allow us to make general (or) existential statements.

1. Universal Quantifier ($\forall$) ("For all")

   $$\forall x \quad \text{Human}(x) \rightarrow \text{Mortal}(x)$$

   For all x, if x is a human, then x is mortal.

2. Existential Quantifier ($\exists$) ("There exists").

   $$\exists x \quad \text{Loves}(x, \text{mary})$$

   There exists at least one x who loves mary.

Difference b/w propositional Logic and First order Logic

Feature	Propositional Logic	First-order Logic (FOL).
objects	No objects	uses objects (constant, variable)
Relations	cannot express relations	can find relationships (predicates)
Functions	Not possible	Functions are allowed
Quantifiers	Not avaliable	uses $\forall$ (For all) and $\exists$ (exists)
Ex:	$P \lor Q$ (Either P or Q)	$\forall x$ (Human (x) $\rightarrow$ Mortal (x)).