

A **MODEL** for a group of formulas consists of a finite set U , which we will represent as a finite set of whole numbers

$$U = \{1, 2, 3, \dots, n\}$$

plus an **EXTENSION** for each predicate letter (PL), name letter (NL) and sentence letter (SL) occurring in the formulas as follows.

- (1) The *extension of a PL* is a set of elements from U ; i.e., a subset of U .
- (2) The *extension of a NL* is a single element of U .
- (3) The *extension of a SL* is a truth value (i.e., either T or F).

Given a model every formula in the group has a truth value (with respect to that model)

Ex. Consider the formulas : $P \rightarrow Q, FA, GB, \wedge x(Fx \vee Gx), \forall x(Fx \wedge Gx)$.

Here's a model for these five formulas.

$U = \{1, 2, 3\}$ So there are these three individuals in the universe of discourse.

F: { 2, 3}
 G: {}
 A=3
 B=1
 P : True
 Q: False

Since the extension of F is {2, 3} we understand that "F" is true of the individual designated by "2" and true of "3" but false of "1". "G" is false of all three individuals in the universe U , since its extension is empty. Here's another way of representing that information.

A=3			F	G
B=1		1	-	-
P : True		2	+	-
Q: False		3	+	-

With respect to this model

$\wedge x(Fx \vee Gx)$ and $\forall x(Fx \wedge Gx)$ are both FALSE.

$P \rightarrow Q$ is FALSE.

FA is TRUE (since A=3 and 3 is in the extension of F).

GB is FALSE (since B=1 and 1 is not in the extension of G).