

Meaning of proposition

A **proposition** (or **statement**) is a sentence that is either **True** or **False**.

Example of proposition

- $10 \div 2 = 4$
- 5 is an even number.
- Today is Wednesday

Example of non-proposition

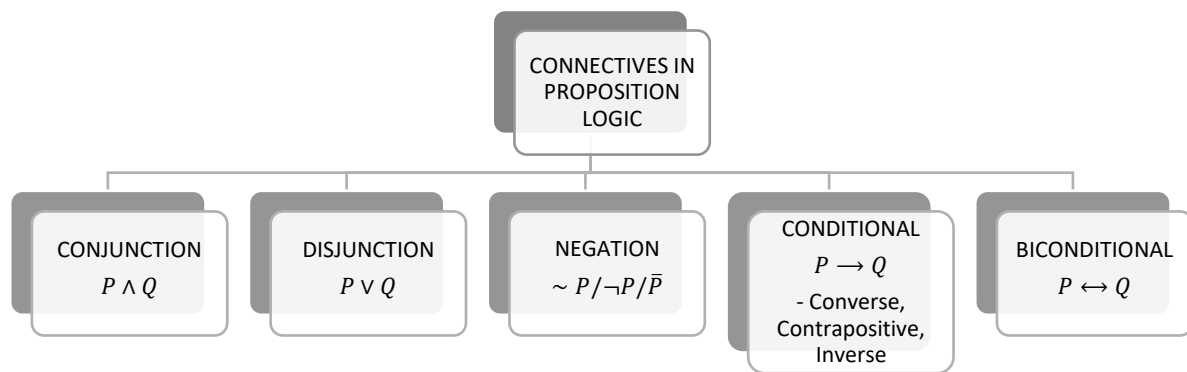
- Where do you live?
- Please answer the
- question correctly.
- $x < 10$

TWO PROPOSITIONS

p	q
T	T
T	F
F	T
F	F

THREE PROPOSITIONS

p	q	r
T	T	T
T	T	F
T	F	T
T	F	F
F	T	T
F	T	F
F	F	T
F	F	F



Tautology

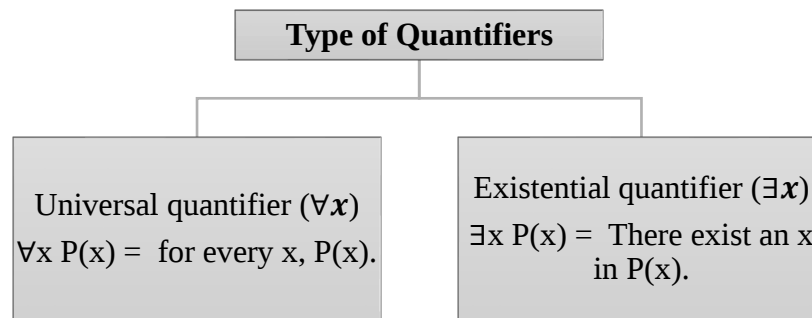
- A proposition $P(p, q, r, \dots)$ is a **tautology** if it contains **only T in the last column** of its truth table.

Contingency

- A proposition $P(p, q, r, \dots)$ is a **contingency** if it contains both **T and F** in the last column of its truth table.

Contradiction

- A proposition $P(p, q, r, \dots)$ is a **contradiction** if it contains **only F in the last column** of its truth table.



SOME EXAMPLE OF QUANTIFIERS

Let the universe be the set of airplanes and let $F(x, y)$ denote " x flies faster than y ". Write each proposition in words.

- a) $\forall x \forall y F(x, y)$ $\longrightarrow$ "Every airplane is faster than every airplane"
- b) $\forall x \exists y F(x, y)$ $\longrightarrow$ "Every airplane is faster than some airplane"
- c) $\exists x \forall y F(x, y)$ $\longrightarrow$ "Some airplane is faster than every airplane"
- d) $\exists x \exists y F(x, y)$ $\longrightarrow$ "Some airplane is faster than some airplane"