Logic

Tutorial 1
10 October 2019

Truth tables

1. Give the truth table of the following formula :

$$G \triangleq (p \Rightarrow q) \Rightarrow [(\neg p \Rightarrow q) \Rightarrow q]$$

   What conclusions can you make ?

2. Give the truth table of the following formula :

$$G \triangleq (p \equiv \text{true}) \Rightarrow [(\neg p \wedge q) \Rightarrow \text{true}]$$

   What can you say about the formula $(\neg p \wedge q) \Rightarrow \text{true}$?
   Is G valid, inconsistent or consistent ?

3. Giving a truth table of a formula consists in enumerating all possible interpretations over the atoms of said formula.

   — How many lines are in a truth table ?
   — How many non-logically equivalent formulas can be constructed using a set of n atoms ?

4. Give the truth table of the following formula :

$$G \triangleq (q \Rightarrow r) \Rightarrow [(p \Rightarrow q) \Rightarrow (p \Rightarrow r)]$$

5. Give the truth table of the following formula :

$$G \triangleq (p \vee q) \wedge \neg p \wedge \neg q$$

6. If Robinson is elected president, then Smith will be designated vice-president. If Thompson is elected president, then Smith will designated be vice-president. Either Thompson or Robinson will be elected president. Therefore Smith will be designated vice-president.

   Is this text correct ?