Lecture 1 (8/26/13)

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4:53 PM

Logical Language

- Logical language - differs from 'spoken/understood' language.
  - If it rains, I will drive to work.
    - What will happen if it doesn't rain? Cannot determine. Only known what happens if statement is 'true' (rains).
  - I will go to the movies or the party.
    - Does not exclude the possibility of both. Normal connotations would suggest it is either/or.
  - He is nice.
    - Isn't specific. He cannot be known until defined. It is not a declarative statement

Statement is a declarative sentence. It is true or false.

Ex:

The radius of the earth is 20,000 meters.
- Is declarative because it is either true or false without necessarily knowing which…

Ex (NOT a statement):

If X^2, then X=3.
- If X ∈ {integers}, then the statement is false since X=-3 could be the case.
- If X ∈ {positive integers}, then statement is TRUE.
- We cannot establish that the sentence is TRUE or FALSE.

We must know the "universe"/ constraints.

Do your Homework!
- Neither TRUE or FALSE

Did you do your homework?
- (Question - not declarative)

Statement

Statements can be:

"10 is an even number."
"9 is an even number."

Can be represented mathematically…

P = "10 is an even number."
Q = "9 is an even number."

P and Q: "10 is an even number."
"9 is an even number."

P and Q = P^Q

P or Q = PvQ

P or Q = PvQ

"Not" P = ~P -> "It is not the case that 10 is an even number."
"10 is not an even number."

P - "I am going to the party."
Q - "I am going to the movies."

PvQ - " I am going to the party or the movies."
includes the possibility of both

What is ~(PvQ)?

"I am not going to the movies or the party." ?
- Can be difficult to understand

Do NOT need to understand the statement to determine TRUE or FALSE.
- Use Truth Table.

P	Q	PvQ	~(PvQ)
True	True	True	False
True	False	True	False
False	True	True	False
False	False	False	True

We can also understand ~(PvQ) as equal to (~P) ^ (~Q) (IE: Not P and Not Q).
**This is universally true and will be proven later*