Unit I: Logics and Proofs Text Book: Chapter 1

The rules of logic gives precise meaning to mathematical statement. These rules are used to distinguish between valid and invalid statement. Logic has numerous applications in computer science.



Proposition

It is a declarative sentence that is either true or false, but not both.

Examples:

- A. Republic day is celebrated on 26 January.
- B. 3+2=7.
- C. Covid-19 was first identified in China.
- D. A triangle is made of 4 sides.
- E. Sit down!
- F. What a beautiful morning!

G.
$$x + 2 = 8$$

H.
$$x^2 > 5$$

The truth value of proposition is denoted by

• T, if it is true proposition.

The truth value of proposition is denoted by

- T, if it is true proposition.
- F, if it is false proposition.

Compound Proposition

We are going to deal with mose than one statement.

Logical Operators

1. Negation: Let p be a proposition. The negation of p, denoted by $\neg p$ or \overline{p} . This operator constructs a new proposition from single existing proposition.

It is read as not p. It is written as "It is not the case that p"

Example:

p: Today is Thursday. 76: It is not the cause Mad Today is Thursday.

76: Today is not Thursday.

q: There is no pollution in New Jersey.

79: This is not the case that There is no pollutioning.
New Jerney. 79: There is pollution in New Jersey.

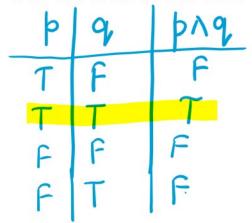
r: At least 10 inches of rain fell today in Namchi.

7r: It is not the case That at least 10 inches of rain fell today in Namachi. It is false Mal

There is admost 10 inches of rain fell today

There is admost 10 inches of rain fell Noby in Namachi. | Description | Paragraphic |

2. Conjunction: Let p and q be propositions. The conjunction of p and q is denoted by $p \wedge q$. The conjunction is true when both p and q are true and is false otherwise.



Examples:

p: Rebacca's PC has more than 16 GB free hard disk space.

q: The processor in Rebacca's PC runs faster than 1GHz.

3. Disjunction: Let p and q be propositions. The disjunction of p and q is denoted by $p \lor q$. The disjunction is false when both p and q are false and is true otherwise.

is denoted by $p \vee q$. The disjunction is false when both p and q are false and is true otherwise.

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T	TFTF	T	Either, or at beat
F	T	T F	,

Example:

p: I bought a lottery ticket this week.

q: I won a million dollar jackpot on Friday.

pvq: Caller I bought a lettery — or I wan a million dellar jackpot on Riday