1. Easy and Simple explanation of logic operators

Here are explained the most widely known logic operators such as Negation, Implication, OR, AND, XOR. Let's begin

- Negation, $\neg p$, $\sim p$. Operator which simply inverses the input p, for example if p is true, then $\neg p$ or $\sim p$ is false.

- Implication, $p \to q$, Logical If statement (If p then q). Checks the whenever the input p is true by means of output q, when you see implication of two variables, let say p, q and their implication $p \to q$, first keep your attention to output q. If you get q is true from false p, then obviously implication is true, since you get true from false, which is impossible unless p is also true. For example, A and B are friends, A says to B sentence q: *B, you can't fly*, which implies sentence p: *If B jumps from window he falls*. If friend B verifies sentence q and he really falls, then implication $p \to q$ is true. But if friend B verifies sentence q in open space he will receive q is false, then implication $p \to q$ is also false.

- Conjunction, $p \wedge q$ - Logical AND statement. For example, *p: Ann is on the softball team*, *q: Paul is on the football team*, then $p \wedge q$ **is true if and only if** p, q **both are true**. The $p \wedge q$ pronounced as "Ann is on the softball team AND Paul is on the football team".

- Disjunction, $p \vee q$ - Logical OR statement. The choosing between two statements p, q that can be either true or false. For example, imagine you are main actor of the film Matrix, the Morphius came to you and ask which pillow p, q will you choose ? Red one, p which is *TRUE*, or blue one q which is *FALSE* ? What will you choose ? As good person, you always choose *TRUE* between two propositions p, q, unless p, q are both *FALSE*. So, disjunction of two inputs p, q is always *TRUE* unless p, q are not both *FALSE*.

- Biconditional statement (If and only if), $p \leftrightarrow q$: $p \leftrightarrow q = (p \to q) \wedge (q \to p)$, logical tautology. Statement $p \leftrightarrow q$ is true, whenever $p = q$ and false if $p \neq q$.

- Exclusive disjunction, $p \otimes q$, Exclusive OR statement. Sentence $p \otimes q$ is True if and only if $p \neq q$. In other words, $p \otimes q$ is true only when you actually have a chose, like you can choose between true p and false q. Otherwise, $p \otimes q$ is false, i.e when $p = q = TRUE$ or $p = q = FALSE$.

- Sheffer stroke, logical NotAND, $p \mid q = \neg(p \wedge q)$. Simple negation of AND $p \wedge q$. If $p \wedge q$ is true, then $p \mid q$ is false and vise-versa.

- Pierces arrow, logical NotOR, $p \downarrow q = \neg(p \vee q)$. Simple negation of OR $p \vee q$. If $p \vee q$ is true, then $p \downarrow q$ is false and vise-versa.