Short List of Useful Symbols

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Mathematical proofs are arguments. In order for the reader to follow your proof, it is often useful to write mathematical statements with connecting words or phrases to explain the flow of logic. For example, we use “claim” and “proof”:

Claim: $(x+y)^2 \geq x^2 + y^2, \forall x, y \in \mathbb{R}, x \geq 1, y \geq 1.$

Proof: Let $x, y \in \mathbb{R}$ such that $x \geq 1$ and $y \geq 1$. $(x+y)^2 = x^2 + 2xy + y^2$. We know that $2xy > 0$ when $x \geq 1, y \geq 1$. Therefore, $(x+y)^2 \geq x^2 + y^2, \forall x, y \in \mathbb{R}, x \geq 1, y \geq 1.$

Mathematical statements often involve notions of equality or inequality, denoted by: $=$, $\geq$, $\leq$, $>$, $<$, $\neq$, $\ngtr$, $\nless$ as well as notions of inclusion in or exclusion from a set, denoted by: $\subseteq$, $\supseteq$, $\subset$, $\supset$, $\in$, $\nsubseteq$, $\nsupseteq$, $\subsetneq$, and $\supsetneq$.

The phrase “flow of logic” means the direction in which there is implication. Does A imply B or does B imply A? These questions can be avoided by using implication arrows: $\Leftarrow$, $\Rightarrow$, and $\Leftrightarrow$ or the words: “therefore”, “hence”, “since”, “because”, “implies”, and “results from”.

When using a mathematical statement that has already been shown to be true, it is often a good idea to use one of the phrases: “Given:”, “As we have seen...”, and “We already know that....

Other symbols that are often useful to make precise mathematical statements are: $\forall$, $\exists$, and $\exists!$.

For precise meanings of these symbols, the Wikipedia list of mathematical symbols is located at: `http://en.wikipedia.org/wiki/Table_of_mathematical_symbols`