Glossary

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This is intended to be a list of basic definitions for common things in math. This will likely be updated as the year goes on, the most recent version will be at https://MckinleyX.github.io/files/glossary.pdf.

If you think something should be added to the list, or I've made an error, contact me!

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§1 Common symbols

Here's a list of some of the more common symbols you'll see:

$\forall$ — for all

$\exists$ — there exists

$\in$ — is an element of

$\because$ — because

$\therefore$ — therefore

$\mathbb{Z}$ — the set of all integers

$\mathbb{Z}^+$ — the set of all positive integers

$\mathbb{Z}^*$ — the set of all nonnegative integers

$\mathbb{R}$ — the set of all real numbers

$a \mid b$ — a divides b

$\square$ — Used to denote the end of a proof. There are a *lot* of ways to do this, but this is what I use.

QED — see $\square$

$\implies$ — implies. $p \implies q$ if q is true whenever p is true. (Note that if p is false q is not necessarily false.)

§2 Less common symbols

Here are some symbols that are less common:

$\mathbb{N}$ — the set of all natural numbers – be careful around this since not everyone agrees whether 0 is included. In IB it is.

$\mathbb{Q}$ — the set of all rational numbers

$\mathbb{C}$ — the set of all complex numbers

$\binom{n}{r}$ — n choose r

$\iff$ — if and only if, commonly abbreviated as "iff". $p \iff q$ means that both $p \implies q$ and $q \implies p$.

§3 Sample proof

By request, here's a sample proof of a problem:

Problem. Prove that $\frac{a+b}{2} \geq \sqrt{ab}$ for $a, b \geq 0$.

Proof. Let $x = \sqrt{a}$ and $y = \sqrt{b}$.
Note that
$$(x - y)^2 \geq 0$$

Now, after a bit of manipulation,

$$x^2 - 2xy + y^2 \geq 0$$
$$x^2 + y^2 \geq 2xy$$
$$\frac{x^2 + y^2}{2} \geq xy$$

Finally, substituting in, we have
$$\frac{a + b}{2} \geq \sqrt{ab}$$

And we are done. $\qquad\square$

§3 Sample proof