

Mathematics Pre-arrival course: Mathematical Notation

Here is a cheatsheet gathering useful mathematical notation that will be used during lectures at university. We also provide here the commands you would use for these mathematical notation in \LaTeX (see <https://www.latex-project.org/> for more details). It will be useful for communicating on EdStem and for your end of Y1 research posters.

Maths notation	Plain english	\LaTeX syntax
Logic		
$A \implies B$	A implies B	$A \backslash implies B$
$A \iff B$	A if and only if B	$A \backslash iff B$
$\neg A$	not A	$\backslash neg A$
$A \wedge B$	A and B	$A \backslash land B$
$A \vee B$	A or B	$A \backslash lor B$
$\forall x$	For all/any x	$\backslash forall x$
$\exists x$	There exists at least one x	$\backslash exists x$
$\exists! x$	There exists one and only one x	$\backslash exists! x$
$:$ or $ $	Such that	$:$ or $ $
\therefore	Therefore	$\backslash therefore$
\because	Because	$\backslash because$
Important Sets		
\emptyset or \emptyset	the empty set (no members)	$\backslash O$ or $\backslash emptyset$
\mathbb{N}	the Natural numbers	$\backslash mathbb{N}$
\mathbb{Z}	the Integers	$\backslash mathbb{Z}$
\mathbb{Q}	the Rational numbers	$\backslash mathbb{Q}$
\mathbb{R}	the Real numbers	$\backslash mathbb{R}$
\mathbb{C}	the Complex numbers	$\backslash mathbb{C}$
(a, b)	real numbers between a and b , excluding a and b	(a, b)
$[a, b]$	real numbers between a and b , including a and b	$[a, b]$
Numbers		
$a = b$	a is equal to b	$a = b$
$a \neq b$	a is not equal to b	$a \backslash neq b$
$a \approx b$	a is approximately equal to b	$a \backslash approx b$
$a \propto b$	a is proportional to b	$a \backslash propto b$
$a \equiv b$	a is identically equal to b	$a \backslash equiv b$
$a \cong b$	a is isomorphic to b	$a \backslash cong b$
$\langle a, b \rangle$	scalar product of a and b	$\backslash langle a, b \backslash rangle$
$a \mid b$	a divides b	$a \backslash mid b$
$\frac{a}{b}$	a over b	$\backslash frac{a}{b}$
Calculus		
$\sum_{i=1}^n$	sum over index i from 1 to n	$\backslash sum_{i=1}^n$
$\prod_{i=1}^n$	product over index i from 1 to n	$\backslash prod_{i=1}^n$
\int_a^b	Integral over the interval $[a, b]$	$\backslash int_{a}^b$
Set theory		
$a \in A$	a is a member of set A	$a \backslash in A$
$A \cup B$	union of A and B : elements that are in A or B (or both)	$A \backslash cup B$
$A \cap B$	intersection of A and B : elements that are in A and B	$A \backslash cap B$
$A \setminus B$	elements that are in set A but not in B	$A \backslash setminus B$
$A \subseteq B$	A is a subset of B	$A \backslash subseteq B$
$A \subset B$	A is a proper subset of B	$A \backslash subset B$
Miscellaneous		
\square or \blacksquare	"I have finished my proof"	$\backslash square - \backslash blacksquare$
$a := b$	a is defined equal to b	$a := b$
$\#$	contradiction spotted in the proof!	$\backslash \#$

There are also a certain number of useful **abbreviations** including **iff** (if and only if), **wlog** (without loss of generality), **s.t.** (such that) or **QED** (Quod Erat Demonstrandum).