

Some Frequently Used Mathematical Symbols

The set of natural numbers, $\{1, 2, 3, \dots\}$ will be denoted by N .

The set of integers, $\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$ will be denoted by Z .

The set of rational numbers will be denoted by Q .

The set of real numbers will be denoted by R .

The empty set symbol will be denoted by $\{ \}$ or \emptyset .

Symbol	Meaning
\forall	“for every”
\exists	“there exists”
\ni or s.t.	“such that”
w.r.t.	“with respect to”
\Rightarrow	“implies”
\Leftarrow	“is implied by”
\Leftrightarrow or iff	“if and only if” or “is equivalent to”

The Greek Alphabet			
A α	alpha	N ν	nu
B β	beta	Ξ ξ	xi
Γ γ	gamma	O \omicron	omicron
Δ δ	delta	Π π	pi
E ϵ	epsilon	P ρ	rho
Z ζ	zeta	Σ σ	sigma
H η	eta	T τ	tau
Θ θ	theta	Y υ	upsilon
I ι	iota	Φ ϕ	phi
K κ	kappa	X χ	chi
Λ λ	lambda	Ψ ψ	psi
M μ	mu	Ω ω	omega

Symbol	Meaning	Examples
\in	“is an element of”	$2 \in N$ $b \in \{a, b, c, d, e\}$
\notin	“is <i>not</i> an element of.”	$-2 \notin N$ $t \notin \{a, b, c, d, e\}$
\subset	“is a subset of”	$N \subset Z$ $\{a, b, c\} \subset \{a, b, c, d, e\}$
$\not\subset$	“is <i>not</i> a subset of”	$Z \not\subset N$ $\{x, y\} \not\subset \{a, b, c, d, e\}$
\cup	“union” (of sets)	$\{a, b, c\} \cup \{b, d, e\} = \{a, b, c, d, e\}$
\cap	“intersection” (of sets)	$\{a, b, c\} \cap \{b, d, e\} = \{b\}$

Examples: $A \subset B$ implies that every element in A is also contained in B.
Symbolically, we could write: $A \subset B \Rightarrow \forall a \in A, \text{ then } a \in B$.

Two sets are equal if and only if $A \subset B$ and $B \subset A$.
Symbolically, we could write: $A = B$ iff $A \subset B$ and $B \subset A$.

$\lim_{x \rightarrow a} f(x) = L$ means that $\forall \epsilon > 0, \exists \delta > 0, \text{ s.t. } |f(x) - L| < \epsilon$ whenever $0 < |x - a| < \delta$