Greek characters

Name	Symbol	Typical use(s)
alpha	α	angle, constant
beta	β	angle, constant
gamma	γ	angle, constant
delta	δ	limit definition
epsilon	ϵ or ε	limit definition
theta	θ or ϑ	angle
pi	π or ϖ	circular constant
phi	ϕ or φ	angle, constant

Named Sets

empty set	$\varnothing$
real numbers	$\mathbf{R}$
ordered pairs	$\mathbf{R}^2$

integers	$\mathbf{Z}$
positive integers	$\mathbf{Z}_{>0}$
positive reals	$\mathbf{R}_{>0}$

Set Symbols

Meaning	Symbol
is a member	$\in$
subset	$\subset$
intersection	$\cap$

Meaning	Symbol
union	$\cup$
complement	superscript$^{\mathrm{C}}$
set minus	$\setminus$

Logic Symbols

Meaning	Symbol
negation	$\neg$
and	$\wedge$
or	$\vee$
implies	$\implies$

Meaning	Symbol
equivalent	$\equiv$
iff	$\iff$
for all	$\forall$
there exists	$\exists$

Function Notation

$\mathrm{dom}(F)$	domain of function F
$\mathrm{range}(F)$	range of function F
C_A	set of continuous functions on set A
C_A^1	set of differentiable functions on set A
$A \to B$	set of functions from A to B

Magnitude & Conjugate

For all $a, b \in \mathbf{R}$

$$|a + \mathrm{i}b| = \sqrt{a^2 + b^2}$$
$$\overline{a + \mathrm{i}b} = a - \mathrm{i}b$$

For all $x, y, z \in \mathbf{C}$, we have

$$|xy| = |x||y|$$
$$|x + y| \leq |x| + |y|$$
$$\big||x| - |y|\big| \leq |x - y|$$
$$\overline{xy} = \overline{x}\,\overline{y}$$
$$\frac{1}{z} = \frac{\overline{z}}{|z|^2} (\text{ for } z \neq 0)$$
$$\overline{\left(\frac{x}{y}\right)} = \frac{\overline{x}}{\overline{y}}$$

Complex Exponential

For $x, y \in \mathbf{R}$

$$\mathrm{e}^{\mathrm{i}y} = \cos(y) + \mathrm{i}\sin(y)$$
$$\mathrm{e}^{x + \mathrm{i}y} = \mathrm{e}^x \left(\cos(y) + \mathrm{i}\sin(y)\right)$$

For all $z_1, z_2 \in \mathbf{C}$,

$$\mathrm{e}^{z_1 + z_2} = \mathrm{e}^{z_1}\mathrm{e}^{z_2}$$
$$[\mathrm{e}^{z_1} = \mathrm{e}^{z_2}] \equiv [z_1 - z_2 = 2\pi n, n \in \mathbf{Z}]$$

Argument & Polar form

For all $z \in \mathbf{C}_{\neq 0}$, there is a unique $\theta \in (-\pi, \pi]$ such that

$$z = |z|(\cos(\theta) + \mathrm{i}\sin(\theta))$$
$$\arg(z) = \theta$$

We have

$$\sqrt{z} = \sqrt{|z|}(\cos(\theta/2) + \mathrm{i}\sin(\theta/2))$$
$$z^a = |z|^a(\cos(\theta/a) + \mathrm{i}\sin(\theta/a)) (\text{ for } z \in \mathbf{R}_{\neq 0})$$
$$\log(z) = \log(|z|) + \mathrm{i}\arg(z)$$