

Common Mathematical Symbols

\emptyset	The empty set. I.e., a set with nothing in it. Not the Greek letter phi (ϕ), and not a synonym for “does not exist”.
\mathbb{R}	The set of real numbers.
\in	“is an element of”; the thing after it should be a set. For example, $\pi \in \mathbb{R}$.
\subset, \subseteq	“is a subset of”. Both things should be sets. For example, $[0, 1] \subseteq \mathbb{R}$.
\subsetneq	“is an open subset of”. Not standard notation, but an excellent thing to have a symbol for.
$\{\dots \dots\}$	Set-builder notation. The $ $ means “such that”; sometimes $:$ is used instead. The notation can be translated word-for-word into English: for example, $\{y \in Y \mid y = f(x) \text{ for some } x \in X\}$ (p.83 of Colley) means, literally, “the set of all elements y of the set Y such that $y = f(x)$ for some element x of the set X ”.
$f : X \rightarrow Y$	“ f is a function from X to Y ”.
$\ \mathbf{x}\ $	Magnitude of the vector \mathbf{x} (a.k.a. length, norm)
Df	The derivative matrix of a function f .
$D_{\mathbf{u}}f(\mathbf{a})$	Directional derivative of function f in direction \mathbf{u} at point \mathbf{a}
$f \circ g$	The composition of two functions: $(f \circ g)(x) = f(g(x))$. Note that $f \circ g \neq g \circ f$.
$\frac{\partial f}{\partial x}, f_x$	Partial derivative of f with respect to x .
∇f	The gradient of a scalar-valued function f . Identical to Df , but only used for scalar-valued functions.
$\nabla \cdot \mathbf{F}$	Divergence of a vector field \mathbf{F}
$\nabla \times \mathbf{F}$	Curl of a vector field \mathbf{F}