

Problems in Mathematics & Experiments with Mathematica

Notations

Throughout the book, notations and symbols mostly follow the usual mathematical notations. In the text parts, the notations are traditional. In the *Mathematica* input statements, we use the *Mathematica* notations in two different ways. We use *Mathematica* Traditional Form to formulate problems. On the other hand, Standard or Input Forms are used in the solutions, or to emphasize the *Mathematica* procedures. *Mathematica* Traditional Form essentially follows the usual mathematical symbolism, but there are some differences due to the specific requirements of the programming language of *Mathematica*. The Standard Form and Input Form are different (but easily understandable). To learn them, see the chapter [A short introduction to Mathematica](#).

The non-standard Mathematica-specific notations are typed in Bold.

| Usual Notation | <i>Mathematica</i> Traditional Form | Meaning, explanation |
|---|--|--|
| $\{a, b, c, d\}$ | $\{a, b, c, d\}$ | set, defined by the elements list in <i>Mathematica</i>, see A short introduction to Mathematica |
| $a \in A$ | | element of a set |
| \subset | | subset |
| \cap | | intersection of sets |
| \cup | | union of sets |
| ϕ | | empty set |
| \setminus | | set minus |
| \wedge | \wedge | logical and |
| \vee | \vee | logical or |
| \Rightarrow | | implication |
| \Leftrightarrow | | equivalence |
| \exists | | there exists |
| \forall | | for all |
| ∞ | ∞ | infinity |
| \mathbb{R}, \mathbb{R}^n | | set of real numbers, n dimensional real space |
| $A \times B$ | | Cartesian product |
| N | | natural numbers |
| I | | integer numbers |
| Q | | rational numbers |
| $[a, b],$ $(a, b],$ $[a, b), (a, b)$ | | intervals |
| $<, > ,$ \leq, \geq | $<, > ,$ \leq, \geq | inequalities |
| $ a $ | $ a $ | absolute value |
| Σ | Σ | sum |
| Π | Π | product |
| $n!$ | | factorial of n |
| min | Min | minimum |
| max | Max | maximum |
| π | π | the number π |
| e | e | the number e |
| $f(x)$ | $f(x)$ | the value of the function f at x |
| | $f(x_) :=$ | definition of the function f |
| $\lim_{x \rightarrow x_0} f(x)$ | $\lim_{x \rightarrow x_0} f(x)$ | limit |
| $f'(x)$ | $f'(x)$ | derivative |
| $\frac{\partial f(x,y)}{\partial x},$ $\frac{\partial^2 f(x,y)}{\partial x^2}$ | $\frac{\partial f(x,y)}{\partial x}, \frac{\partial^2 f(x,y)}{\partial x^2}$ | partial derivatives |
| $\int f(x) dx$ | $\int f(x) dx$ | indefinite integral |