

## Part II

# Foundations

## Vocabularies

$a \cdot b$  “ $a$  times  $b$ ”  
“ $a$  multiplied by  $b$ ”  
“ $a$  into  $b$ ”

$\frac{a}{b}$  “ $a$  divided by  $b$ ”  
“ $a$  by  $b$ ”  
“ $a$  over  $b$ ”

( $a$ : numerator (**Zähler**),  $b$ : denominator (**Nenner**))

$a^b$  “ $a$  raised to the  $b$ -th power”  
“ $a$  to the  $b$ -th”  
“ $a$  raised to the power of  $b$ ”  
“ $a$  to the power of  $b$ ”  
“ $a$  raised to  $b$ ”  
“ $a$  to the  $b$ ”  
“ $a$  raised by the exponent of  $b$ ”

## Vocabularies

$n!$  “ $n$  factorial”

$\binom{n}{k}$  “ $n$  choose  $k$ ”

$x_i$  “ $x$  subscript  $i$ ”  
“ $x$  sub  $i$ ”  
“ $x$   $i$ ”

$\log_b a$  “log to the base  $b$  of  $a$ ”  
“log  $a$  to the base  $b$ ”

$$f: X \rightarrow Y, x \mapsto x^2$$

$f$  is a function that maps from **domain** (**Definitionsbereich**)  $X$  to **codomain** (**Zielmenge**)  $Y$ . The set  $\{y \in Y \mid \exists x \in X: f(x) = y\}$  is the **image** or the **range** of the function (**Bildbereich/Wertebereich**).

## 3 Goals

- ▶ Gain knowledge about efficient algorithms for important problems, i.e., learn how to solve certain types of problems efficiently.
- ▶ Learn how to analyze and judge the efficiency of algorithms.
- ▶ Learn how to design efficient algorithms.