

Definitions

Term	Notation	Example(s)	We say in English ...
sequence	x_1, \dots, x_n		A sequence x_1 to x_n
summation	$\sum_{i=1}^n x_i$ or $\sum_{i=1}^n x_i$		The sum of the terms of the sequence x_1 to x_n
all reals	\mathbb{R}		The (set of all) real numbers (numbers on the number line)
all integers	\mathbb{Z}		The (set of all) integers (whole numbers including negatives, zero, and positives)
all positive integers	\mathbb{Z}^+		The (set of all) strictly positive integers
all natural numbers	\mathbb{N}		The (set of all) natural numbers. Note: we use the convention that 0 is a natural number.
piecewise rule definition	$f(x) = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$		Define f of x to be x when x is nonnegative and to be $-x$ when x is negative
function application	$f(7)$ $f(z)$ $f(g(z))$		f of 7 or f applied to 7 or the image of 7 under f f of z or f applied to z or the image of z under f f of g of z or f applied to the result of g applied to z
absolute value	$ -3 $		The absolute value of -3
square root	$\sqrt{9}$		The non-negative square root of 9

Defining sets

To define sets:

To define a set using **roster method**, explicitly list its elements. That is, start with $\{$ then list elements of the set separated by commas and close with $\}$.

To define a set using **set builder definition**, either form “The set of all x from the universe U such that x is ...” by writing

$$\{x \in U \mid \dots x \dots\}$$

or form “the collection of all outputs of some operation when the input ranges over the universe U ” by writing

$$\{\dots x \dots \mid x \in U\}$$

We use the symbol \in as “is an element of” to indicate membership in a set.

Example sets: For each of the following, identify whether it’s defined using the roster method or set builder notation and give an example element.

$$\{-1, 1\}$$

$$\{0, 0\}$$

$$\{-1, 0, 1\}$$

$$\{(x, x, x) \mid x \in \{-1, 0, 1\}\}$$

$$\{\}$$

$$\{x \in \mathbb{Z} \mid x \geq 0\}$$

$$\{x \in \mathbb{Z} \mid x > 0\}$$

$$\{\text{A}, \text{C}, \text{U}, \text{G}\}$$

$$\{\text{AUG}, \text{UAG}, \text{UGA}, \text{UAA}\}$$