

The `setbuilder` package

Smart set-builder notation
with correctly scaled braces and separator

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<https://github.com/vssekorin/setbuilder>

1 Introduction

Typesetting set-builder notation correctly in $\text{\LaTeX}$ is surprisingly fiddly. The naive markup

$$\{ x \mid x > 0 \}$$

breaks down as soon as the contents grow: the braces stay small. The robust alternative,

$$\left\{ \dots \middlevert \dots \right\}$$

makes the markup unreadable, and the thin spaces around the bar must be inserted by hand—and removed again by hand in subscripts.

The `setbuilder` package reduces all of this to one command:

$$\set{x \in \mathbb{R} \given x^2 < 2} \qquad \{x \in \mathbb{R} \mid x^2 < 2\}$$

with correct spacing around the separator, automatic or fixed scaling of *both* the braces and the bar, spaces that vanish in sub- and superscripts, and a permitted line break after the bar in inline formulas.

2 Usage

`\usepackage{setbuilder}`

2.1 The `\set` command

$$\set{1, 2, 3, \dots} \qquad \{1, 2, 3, \dots\}$$
$$\set{x \in \mathbb{R} \given x^2 < 2} \qquad \{x \in \mathbb{R} \mid x^2 < 2\}$$

The separator is written `\given` (or its synonym `\suchthat`). Both raise a helpful error when used outside `\set`.

2.2 Auto-scaling: `\set*`

The starred form wraps the contents in `\left...\middle...\right`, so the braces *and* the bar grow together:

$$\backslash set*{\frac{n}{n+1}} \backslash given n \in \mathbb{N}$$

$$\left\{ \frac{n}{n+1} \mid n \in \mathbb{N} \right\}$$

$$\backslash set*{A \subseteq \mathbb{N} \mid \sum_{a \in A} \frac{1}{a} < \infty}$$

$$\left\{ A \subseteq \mathbb{N} \mid \sum_{a \in A} \frac{1}{a} < \infty \right\}$$

2.3 Fixed size: `\set[Big]`

When auto-scaling overshoots (the classic `\left\right` complaint), pick the size yourself:

$$\backslash set[Big]{x \mid f(x) = \max_y f(y)}$$

$$\left\{ x \mid f(x) = \max_y f(y) \right\}$$

2.4 Correct spacing in scripts

The thin spaces around the separator are inserted with `\nonscript\:`, so they disappear in sub- and superscripts where they would look bloated:

$$\bigcup_{i \in \{n \mid n \geq 1\}} A_i \quad \text{compare hand-made:} \quad \bigcup_{i \in \{n \mid n \geq 1\}} A_i$$

2.5 Nesting

$$\backslash set*{\set{x \mid \sim y} \mid y \in Y}$$

$$\{\{x \mid x \sim y\} \mid y \in Y\}$$

3 Package options

Options use the key–value syntax of the modern L^AT_EX kernel.

bar (default) The separator is a vertical bar: $\{x \mid x > 0\}$.

colon The separator is a colon throughout the document, as preferred in some traditions: $\{x : x > 0\}$.

synonym=<name> Additionally defines `\<name>` as a full copy of `\set`, including the starred and fixed-size variants. This document, for instance, is compiled with **synonym=Setb**:

$$\backslash Setb*{\frac{1}{n}} \backslash given n \geq 1$$

$$\left\{ \frac{1}{n} \mid n \geq 1 \right\}$$

3.1 What if `\set` is already taken?

Some packages define their own `\set`. In that case **setbuilder** *never* overwrites the existing command. Instead:

- if a synonym was requested, the synonym silently becomes the way to access the functionality:
`\usepackage[synonym=mkset]{setbuilder}`
- if no synonym was requested, the package issues a warning with exactly this advice, and the document still compiles.

Requesting a synonym whose name is itself taken (**synonym=section**) produces a clear error message.

4 Requirements

The package loads `mathtools` and requires a L^AT_EX kernel from 2022-06-01 or newer (for key–value package options and `\NewCommandCopy`).

5 Implementation notes

The command is built with `\DeclarePairedDelimiterX` from `mathtools`, which provides the plain, starred and sized variants uniformly. Inside the delimiter body, `\given` is redefined locally to typeset the separator at the current delimiter size (`\delimsize`). The separator itself is

`\nonscript\:` `<bar>` `\allowbreak` `\nonscript\:` `\mathopen{}`

where the trailing `\mathopen{}` makes a following unary minus space correctly, and `\allowbreak` permits a line break after the bar in inline material.

6 Changes

v0.1.1 (2026-07-25) Bug fix: `\given` and `\suchthat` are now robust, so they survive expansion in moving arguments (section titles, captions) unbroken.

v0.1.0 (2026-07-19) First public version.