

# key-theorems package

version 0.0.2 $\alpha$

[github.com/mbertucci47/key-theorems](https://github.com/mbertucci47/key-theorems)

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## Abstract

An expl3-implementation of a key-value interface to `amsthm`, implementing most of the functionality provided by `thmtools`. Very much not a finished product. Don't use it for anything important!

## 1 Load-time Options

`overload` (initially unset)

Redefines `\newtheorem` to internally use the `key-theorems` machinery. The syntax remains the same.

`thmtools-compatible` (initially unset)

For compatibility with `thmtools` syntax. Currently defines the `\declaretheoremstyle`, `\declaretheorem`, and `\listoftheorems` commands and the `restatable` environment.

`store-all` (initially unset)

Tells `key-theorems` to grab the body of each theorem so it can later be printed with `\listofkeytheorems[print-body]`. Note that this means a theorem body *cannot* contain verbatim material.

## 2 Global Options

`\keytheoremset{<options>}`

`restate-counters={<comma-list of counters>}` (initially `{equation}`)

Additional counters whose values are preserved when a theorem is restated. This key does not reset the list, so you don't need to include `equation` in `<comma-list>`.

`continues-code=<code with #1>` (initially continuing from `p.\`, `\pageref{#1}`)

The code used to typeset the note produced by the `continues`<sup>P.2</sup> key.

`qed-symbol=<symbol>` (initially `\openbox`)

Redefines `\qedsymbol` to be `<symbol>`.

## 3 Declaring Theorems

`\newkeytheorem{<env name>}[<options>]`

Defines a theorem environment `<env name>` which itself takes a few options (see subsection 3.1). You can also declare multiple theorems at once by replacing `<env name>` with a comma-list of names, e.g. `\newkeytheorem{theorem,lemma,proposition}[<options>]`.

By default, the theorem's printed name is a title-cased `<env name>`. This can be changed with the `name`<sup>P.3</sup> key. All `<options>` are described in subsections 3.2 and 3.3.

```
% preamble
\newkeytheorem{theorem}

% document
\begin{theorem}
Some text
\end{theorem}
```

**Theorem 1.** *Some text*

### 3.1 Keys available to theorem environments

As in `amsthm`, theorems can take an optional argument that contains a note or heading.

```
\begin{theorem}[some heading]
Some text
\end{theorem}
```

**Theorem 2** (some heading). *Some text*

Alternatively, the optional argument may contain any of the following keys.

`note=<text>` (initially unset)

Alias `name`. This is the key-value equivalent of the optional argument described above. This syntax, however, allows the argument to contain other keys.

```
\begin{theorem}[some heading]
Some text
\end{theorem}
\begin{theorem}[note=another heading]
Some more text
\end{theorem}
```

**Theorem 3** (some heading). *Some text*

**Theorem 4** (another heading). *Some more text*

`label=<label name>` (initially unset)

This is the key-value equivalent of `\begin{theorem} \label{<label name>}`.

```
\begin{theorem}[label=foo]
Some text
\end{theorem}
\ref{foo}
```

**Theorem 5.** *Some text*

5

`continues*=<label name>` (initially unset)

Pick up a theorem where you left off. The theorem number remains the same. The printed text can be customized with the `continues-code`<sup>P.1</sup> option. The starred version also copies the theorem note, if it exists.

```
\begin{theorem}[continues=foo]
\dots and some more text.
\end{theorem}
```

**Theorem 5** (continuing from p. 2). *... and some more text.*

`store=<cname>` (initially unset)

Alias `restate`. Defines a command `\<cname>` that can be used to restate the theorem, including the body text, later in the document. This is the local version of the `store-all`<sup>P.1</sup> load-time option. A theorem given this key *cannot* contain verbatim material.

```
\begin{theorem}[store=blub]
A theorem worth restating.
\end{theorem}
More brilliant mathematics.
\blub
```

**Theorem 6.** *A theorem worth restating.*

More brilliant mathematics.

**Theorem 6.** *A theorem worth restating.*

### 3.2 Keys inherited from thmtools

These are the [*options*] passed to `\newkeytheorem`. For more description, see the `thmtools` package.

`name=<display name>` (initially title-cased *<env name>*)

Aliases `title` and `heading`.

<pre>% preamble \newkeytheorem{mythm}[name=Some Name]  % document \begin{mythm} Some text \end{mythm}</pre>	<p><b>Some Name 1.</b> <i>Some text</i></p>
---	---

`numbered=true|false` (default `true`, initially `true`)

For compatibility with `thmtools`, also accepts the values `yes` and `no`.

<pre>% preamble \newkeytheorem{theorem*}[   name=Theorem, numbered=false ]  % document \begin{theorem*} An unnumbered theorem. \end{theorem*}</pre>	<p><b>Theorem.</b> <i>An unnumbered theorem.</i></p>
---	--

`parent=<counter>` (initially unset)

Aliases `numberwithin` and `within`.

<pre>% preamble \newkeytheorem{conjecture}[parent=section]  % document \begin{conjecture} The first number is the section. \end{conjecture}</pre>	<p><b>Conjecture 3.1.</b> <i>The first number is the section.</i></p>
---	---

`sibling=<counter>` (initially unset)

Aliases `numberlike` and `sharennumber`.

<pre>% preamble \newkeytheorem{lemma}[sibling=theorem]  % document \begin{lemma} This shares its counter with \texttt{theorem}. \end{lemma}</pre>	<p><b>Lemma 7.</b> <i>This shares its counter with theorem.</i></p>
---	---

`style=<style name>` (initially unset)

Accepts any *<style name>* defined by `\newkeytheoremstyle`<sup>P. 5</sup>, as well as any of the predefined `amsthm` styles: `plain`, `definition`, and `remark`.

<pre> % preamble \newkeytheorem{remark}[style=remark]  % document \begin{remark} Some text \end{remark} </pre>	<p><i>Remark 1. Some text</i></p>
--	-----------------------------------

`preheadhook`= $\langle code \rangle$  (initially unset)  
`postheadhook`= $\langle code \rangle$  (initially unset)  
`prefoothook`= $\langle code \rangle$  (initially unset)  
`postfoothook`= $\langle code \rangle$  (initially unset)

Details in section 6.

<pre> % preamble \newkeytheorem{test}[   preheadhook=PREHEAD,   postheadhook=POSTHEAD,   prefoothook=PREFOOT,   postfoothook=POSTFOOT ]  % document \begin{test} Some text \end{test} </pre>	<p>PREHEAD</p> <p><b>Test 1.</b> <i>POSTHEAD</i>Some text <i>PREFOOT</i></p> <p>POSTFOOT</p>
--	--

`refname`= $\langle ref name \rangle$  or  $\{\langle singular name \rangle, \langle plural name \rangle\}$  (initially  $\langle display name \rangle$ )

If a single string, then the name used by `hyperref`'s `\autoref` and `cleveref`'s `\cref`. If two strings separated by a comma, then the second string is the plural form used by `\cref`.

`Refname`= $\langle ref name \rangle$  or  $\{\langle singular name \rangle, \langle plural name \rangle\}$  (initially  $\langle display name \rangle$ )

Same as `refname` but for `\Autoref` (not yet implemented!) and `\Cref`.

<pre> % preamble \newkeytheorem{prop}[   name=Proposition,   refname={proposition,propositions},   Refname={Proposition,Propositions} ]  % document \begin{prop}[label=abc] Some text \end{prop} \begin{prop}[label=def] Some more text \end{prop} \begin{theorem} Consider \cref{abc,def}. \end{theorem} </pre>	<p><b>Proposition 1.</b> <i>Some text</i></p> <p><b>Proposition 2.</b> <i>Some more text</i></p> <p><b>Theorem 8.</b> <i>Consider propositions 1 and 2.</i></p>
--	---

`qed`= $\langle symbol \rangle$  (default `\openbox`, initially unset)

Adds  $\langle symbol \rangle$  to the end of the theorem body. If no value is given, the symbol  $\square$  is used.

```

% preamble
\newkeytheorem{example}[qed]
\newkeytheorem{solution}[qed=$\clubsuit$]

% document
\begin{example}
Some text
\end{example}
\begin{solution}
Some more text
\end{solution}

```

**Example 1.** *Some text* □

**Solution 1.** *Some more text* ♣

### 3.3 Keys added by key-theorems

`tcolorbox={⟨tcolorbox options⟩}` (initially unset)

This key specifies that the theorem be placed inside a `tcolorbox` environment with `⟨options⟩`.

```

% preamble
\tcbset{
  defstyle/.style={
    arc=0mm,
    colback=blue!5!white,
    colframe=blue!75!black
  },
}
\newkeytheorem{corollary}[tcolorbox]
\newkeytheorem{definition}[
  style=definition,
  tcolorbox={defstyle}
]

% document
\begin{corollary}
Some text
\end{corollary}
\begin{definition}
Some more text
\end{definition}

```

**Corollary 1.**

*Some text*

**Definition 1.**

Some more text

## 4 Theorem Styles

`\newkeytheoremstyle{⟨name⟩}{⟨options⟩}`

This is key-theorems' version of `thmtools'` `\declaretheoremstyle[⟨options⟩]{⟨name⟩}`. Since it makes little sense to define a style with no keys, we've made the `⟨options⟩` argument mandatory.

### 4.1 Keys inherited from `thmtools`

The following keys have the same meaning and syntax as the corresponding `thmtools` keys.

`spaceabove=⟨length⟩` (initially `\topsep`)

`spacebelow=⟨length⟩` (initially `\topsep`)

`bodyfont=⟨font declarations⟩` (initially `\itshape`)

`headindent=⟨length⟩` (initially `0pt`)

`headfont=⟨font declarations⟩` (initially `\bfseries`)

`headpunct`= $\langle code \rangle$  (initially `{.}`)

`postheadspace`= $\langle length \rangle$  (initially 5pt plus 1pt minus 1pt)

Do not use this with the `break` key.

`break` (initially unset)

Do not use this with the `postheadspace` key.

`notefont`= $\langle font\ declarations \rangle$  (initially `\fontseries\mddefault\upshape`)

`notebraces`= $\{\langle left\ brace \rangle\}\{\langle right\ brace \rangle\}$  (initially  $\{\{\}\}$ )

`headstyle`=`margin`|`swapnumber`| $\langle code\ using\ \backslash NAME, \backslash NUMBER, and \backslash NOTE \rangle$

Alias `headstyle`. Within  $\langle code \rangle$ , the commands `\NAME`, `\NUMBER`, and `\NOTE` correspond to the formatted parts of the theorem head.

## 4.2 Keys added by key-theorems

`inherit-style`= $\langle style\ name \rangle$  (initially unset)

Inherit the keys of any style declared with `\newkeytheoremstyle`<sup>P.5</sup>. Additionally, the three styles predefined by `amsthm` are possible values: `plain`, `definition`, and `remark`.

## 5 Listing Theorems

`\listofkeytheorems` $\{\langle options \rangle\}$

`\keytheoremset` $\{\langle options \rangle\}$

	List of Theorems
<code>\listofkeytheorems</code>	1 Theorem . . . . . 1
	2 Theorem (some heading) . . . . 2
	3 Theorem (some heading) . . . . 2
	4 Theorem (another heading) . . 2
	5 Theorem . . . . . 2
	5 Theorem (continuing from p. 2) 2
	6 Theorem . . . . . 2
	1 Some Name . . . . . 3
	Theorem . . . . . 3
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	7 Lemma . . . . . 3
	1 Remark . . . . . 3
	1 Test . . . . . 4
	1 Proposition . . . . . 4
	2 Proposition . . . . . 4
	8 Theorem . . . . . 4
	1 Example . . . . . 4
	1 Solution . . . . . 4
	1 Corollary . . . . . 5
	1 Definition . . . . . 5

### 5.1 Keys inherited from thmtools

`numwidth`= $\langle length \rangle$  (initially 2.3em)

`ignore={⟨comma-list of env names⟩}` (initially unset)

`show={⟨comma-list of env names⟩}` (initially all theorems)

`onlynamed={⟨comma-list of env names⟩}` (initially unset)

`ignoreall` (initially unset)

<pre> \listofkeytheorems[ignoreall,show=theorem] \listofkeytheorems[   ignoreall, show=conjecture,   title=List of Conjectures ] </pre>	<div> <div>List of Theorems</div> <div> 1 Theorem . . . . . 1  2 Theorem (some heading) . . . 2  3 Theorem (some heading) . . . 2  4 Theorem (another heading) . 2  5 Theorem . . . . . 2  5 Theorem (continuing from  p. 2) . . . . . 2  6 Theorem . . . . . 2  8 Theorem . . . . . 4 </div> </div> <div> <div>List of Conjectures</div> <div> 3.1 Conjecture . . . . . 3 </div> </div>
---	--

`showall` (initially set)

`title=⟨text⟩` (initially List of Theorems)

`swapnumber=true|false` (initially false)

## 5.2 Keys added by `key-theorems`

`title-code=⟨code with #1⟩` (initially `\section*{#1}`)

If `\chapter` is defined, then initially this is instead `\chapter*{#1}`.

`no-title` (initially unset)

Suppresses the title of the list of theorems. Useful for custom ordering of the list.

<pre> \keytheoremset{ignoreall} \listofkeytheorems[show=example] \listofkeytheorems[show=solution,no-title] </pre>	<div> <div>List of Theorems</div> <div> 1 Example . . . . . 4  1 Solution . . . . . 4 </div> </div>
--	---

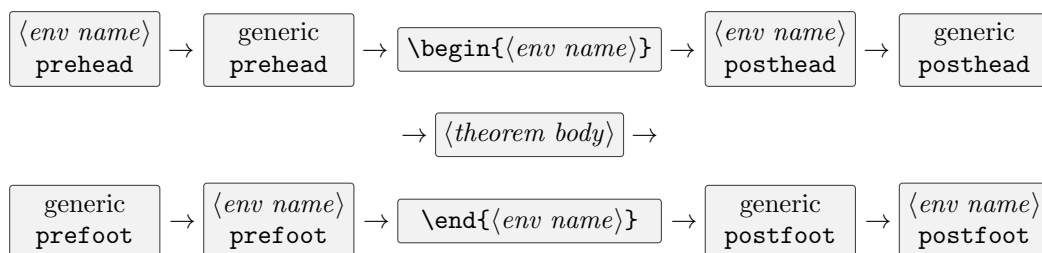
`print-body` (initially unset)

Instead of listing the theorem headings, the theorems are restated with their body text. Requires the `store-all`<sup>P. 1</sup> load-time option to be useful.

## 6 Theorem Hooks

`\addtotheoremhook[⟨env name⟩]{⟨hook name⟩}{⟨code⟩}`

`⟨hook name⟩` can be `prehead`, `posthead`, `prefoot`, or `postfoot`. If no `⟨env name⟩` is given, the `⟨code⟩` is added to the “generic” hook, i.e. applied to all theorems. As in `thmtools`, the order of hooks is as follows:



In thmtools, the `prefoot` and `postfoot` hooks always prepend code, i.e. the code

```

\addtotheoremhook{A}
\addtotheoremhook{B}

```

results in BA after the theorem. With key-theorems, code is added in the order declared, meaning

```

\addtotheoremhook{postfoot}{A}
\addtotheoremhook{postfoot}{B}

```

results in AB after the theorem. This is the behavior of the  $\text{\LaTeX}$  kernel hooks that `key-theorems` uses under the hood.

Right now, code added using the hook keys `preheadhook`<sup>P. 4</sup>, etc. is outermost, meaning executed first in `prehead` and `posthead` and last in `prefoot` and `postfoot`. This may change if I think of good reasons to do so...



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