

# The `mdwthm`\* package

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## 1 User guide

### 1.1 Environments provided

`theorem` The package defines a collection of theorem environments, declared in the usual way. All of them except `claim` share the same counter. If the document class has a `\chapter` command, then they are numbered within the chapter; otherwise there is a single numbering system throughout the document.

`lemma`

`proposition`

`corollary`

`definition` Every environment has a `*`-version, which doesn't print a number. This might be useful every now and then.

`example`

`fact` The environments `theorem`, `lemma`, `proposition`, `claimand` `corollary` are set using the 'plain' style, with the body text in *italics*. The environments `definition` and `example` are set in the 'definition' style, with body text in roman. The remaining environments, `fact`, `remark`, and `note` are set in the 'remark' style.

`remark`

`note`

`claim` The `claim` environment has its own counter, which is reset at the beginning of the `proof` environment. If you say `\qed` in a `proof` environment then it uses your symbol; otherwise it adds its own at the end.

`proof`

### 1.2 Options

The package takes an option `within=<counter>` – number theorems within `<counter>`. If this isn't given, a default is chosen – either numbering in chapters, or global numbering. The `notwithin` option forces global numbering.

---

\*The `mdwthm` package is currently at version 1.0, dated 16 September 2001.

### 1.3 The mdwmargin style

This package also provides a pretty ‘number-hanging-in-the-margin’ theorem style collection, available under the name mdwmargin.

## 2 Implementation of the environments

```
1 (*package)
2 \RequirePackage{mdwkey}
3 \if1%
4   \ifx\if@article\iftrue0
5   \else\ifx\chapter\@undefined0
6   \else\ifx\chapter\relax0
7   \else1\fi\fi\fi
8   \def\mt@within{[chapter]}
9 \else
10  \def\mt@within{}
11 \fi
12 \mkdef{mdwthm:opt}{within}{\def\mt@within{[#1]}}
13 \mkdef{mdwthm:opt}{notwithin}*{\def\mt@within{}}
14 \mkdef*{mdwthm:opt}{\PassOptionsToPackage{#1=#2}{amsthm}}
15 \mkdef*{mdwthm:opt}*{\PassOptionsToPackage{#1}{amsthm}}
16 \def\mt@opt#1{\mkparse{mdwthm:opt}{#1}}
17 \DeclareOption*{\expandafter\mt@opt\expandafter{\CurrentOption}}
18 \ProcessOptions
19 \RequirePackage{amsthm}
```

### 2.1 The simple bits

```
theorem Do the right thing with the numbering rules.
20 \edef\next@{\noexpand\newtheorem{theorem}{Theorem}\mt@within}\next@
21 \newtheorem*{theorem*}{Theorem}

lemma Most of this is very easy.
proposition 22 \theoremstyle{plain}
corollary 23 \newtheorem{lemma}[theorem]{Lemma}
claim 24 \newtheorem*{lemma*}{Lemma}
definition 25 \newtheorem{proposition}[theorem]{Proposition}
example 26 \newtheorem*{proposition*}{Proposition}
fact 27 \newtheorem{corollary}[theorem]{Corollary}
remark 28 \newtheorem*{corollary*}{Corollary}
29 \newtheorem{fact}[theorem]{Fact}
30 \newtheorem*{fact*}{Fact}
31 \newtheorem{claim}{Claim}
32 \newtheorem*{claim*}{Claim}

33 \theoremstyle{definition}
34 \newtheorem{definition}[theorem]{Definition}
35 \newtheorem*{definition*}{Definition}
36 \newtheorem{example}[theorem]{Example}
37 \newtheorem*{example*}{Example}

38 \theoremstyle{remark}
39 \newtheorem{remark}[theorem]{Remark}
40 \newtheorem*{remark*}{Remark}
```

`note` Someone else might also have a `note` environment. Be careful.

```
41 \ifx\note\@undefined
42 \newtheorem{note}[theorem]{Note}
43 \newtheorem*{note*}{Note}
44 \fi
```

`\qedhack` Make `\qed` idempotent.

```
45 \newif\if@qedsw
46 \def\qedhack{%
47 \let\qed@\qed%
48 \global\@qedswtrue%
49 \def\qed{\if@qedsw\global\@qedswfalse\expandafter\qed@\fi}%
50 }
```

`proof` Now to hack the proof environment.

```
51 \renewenvironment{proof}[1][\proofname]{%
52 \setcounter{claim}{0}%
53 \par\normalfont%
54 \ifdim\topsep<\parskip\topsep\parskip\fi%
55 \ifdim\@topsepadd<z@\@topsepaddz@\fi%
56 \trivlist\advance\itemindent\labelsep\let\makelabel\proofstyle%
57 \advance\@topsep-\parskip%
58 \advance\@topsepadd-\parskip%
59 \@qedhack%
60 \item[#1]%
61 }{%
62 \qed\endtrivlist%
63 }
```

`\proofstyle` The `\proofstyle` macro is just a style hook for typesetting the ‘Proof’ label.

```
64 \providecommand\proofstyle[1]{\textit{#1.}}
```

Done.

```
65 </package>
```

### 3 Implementation of the theorem style

```
66 <{*thmstyle}>
```

`\thmhead@margin` Firstly, a macro to typeset the theorem environment header, with the number in the margin.

```
67 \def\thmhead@margin#1#2#3{%
68 \thmnumber{\llap{#2{\normalsize\quad}}}%
69 \thmname{#1}%
70 \thmnote{ \the\thm@notefont(#3)}%
71 }
```

`\thm@headfont@margin` Now to decide on the header font. Definitely we want boldface; if the document-class (or `mdwfonts`) has decided on a different font family for the headings, then we use that.

```
72 \def\thm@headfont@margin{%
```

```

73 \fontseries{\bfdefault}%
74 \ifx\headdefault\@undefined\else\fontfamily\headdefault\fi%
75 \selectfont%
76 }

\qedsymbol Use the nice symbol if available.
77 \AtBeginDocument{\ifx\square\@undefined\else\def\qedsymbol{\square}\fi}

\proofstyle Typeset ‘Proof’ in bold face.
78 \def\proofstyle#1{\thm@headfont@margin#1}

\th@base The \th@base macro provides the basis for our theorem style. The argument is
\@endtheorem something to do at the end of the environment.
79 \def\th@base#1{%
80 \let\thmhead\thmhead@margin%
81 \thm@headfont{\thm@headfont@margin}%
82 \thm@headpunct{}%
83 \advance\thm@postskip-\parskip%
84 \@qedhack%
85 \def\after@thm{#1}%
86 \normalfont%
87 }

Ah, but nobody actually does anything with \after@thm. Let’s fix that.
88 \AtEndOfPackage{\def\@endtheorem{\after@thm\endtrivlist}}

\th@plain Now this is easy. The space hacking in \th@remark is straight from amsthm.
\th@definition
\th@remark 89 \AtBeginDocument{
90 \def\th@plain{\th@base\relax\itshape}
91 \def\th@definition{\th@base\qed}
92 \def\th@remark{%
93 \th@base\qed%
94 \thm@preskip\topsep\divide\thm@preskip\tw@%
95 \thm@postskip\thm@preskip%
96 }
97 }
98 </thmstyle>

```

Mark Wooding, 16 September 2001

## Appendix

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