

# stmtikz package description

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v20250624

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These are the tikz definitions for `stmlatex`. It is build upon the [tikz](#) package.

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# 1. Usage - in the preamble

## 1.1. Load the whole `stmtikz` package

### 1.1.1. Description

This is an interface package which loads `tikz` and definitions commonly required throughout document creation.

By default the package loads

- `stmtikzbase.sty`
- `stmtikzlibraries.sty`
- `stmtikzstyles.sty`
- `stmtikzexternalization.sty`

See subsection 1.1.2 for options to change the default package behavior.

### 1.1.2. Options

**Option *libraries*** This is a boolean option. Expected values are either `true` or `false`. It controls whether to load the standard libraries commonly required.

```
\usepackage[libraries=true|false]{stmtikz}
```

`libraries=true` is the default. It is used in case `libraries=false` is not set explicitly.

**Option *styles*** This is a boolean option. Expected values are either `true` or `false`. It controls whether to load the predefined `tikz` styles.

```
\usepackage[styles=true|false]{stmtikz}
```

`styles=true` is the default. It is used in case `styles=false` is not set explicitly.

**Option *externalization*** This is a boolean option. Expected values are either `true` or `false`. It enables and disables the possibilities for the externalization of `tikzpictures`.

```
\usepackage[externalization=true|false]{stmtikz}
```

`externalization=true` is the default. It is used in case `externalization=false` is not set explicitly.

By default, global externalization is not set by the package. Thus it is required to use `\tikzexternalenable` before the first picture, which is to be created with this feature. See Option *globaleexternalization* for a possibility to allow a global externalization of throughout the document.

**Option *externalizationoutputfolder*** This option expects a string input. Do not add a slash at the end of the string.

With this option it is possible to define a output folder for all externalized `tikzpictures` in case Option *externalization* has the value `true`. The folder location is set relative to the directory of the main `tex`-file.

```
\usepackage[externalizationoutputfolder=$FOLDERNAME$]{stmtikz}
```

The default is `externalizationoutputfolder=ZZZ_TikZ`.

**Option *globaleexternalization*** This is a boolean option. Expected values are either `true` or `false`.

By default externalization is not enabled for `tikzpictures` globally, meaning automatically activated for each `tikzpicture`. It has to be activated explicitly in the document with `\tikzexternalenable`.

It is possible to control this behavior with

```
\usepackage[globaleexternalization=true|false]{stmtikz}
```

`globaleexternalization=false` is the default. It is used in case `globaleexternalization=true` is not set explicitly.

Global externalization is active until the next `\tikzexternaldisable` in your document.

## 1.2. `stmtikzlibraries`

This package contains standard libraries commonly required in the creation of `tikzpictures`.

## 1.3. `stmtikzstyles`

This package contains styles commonly required in the creation of `tikzpictures`.

## 1.4. `stmtikzexternalization`

### 1.4.1. Description

This package enables the externalization of `tikzpictures`.

It requires shell escape. Enabling shell escape is achieved by using the `-shell-escape` command line option when executing `LATEX` or `pdfLATEX`, e.g.

```
pdflatex -shell-escape stmtikz.tex
```

or with `arara`

```
arara: pdflatex: {shell: yes}
```

### 1.4.2. Options

**Option *outputfolder*** This option expects a string input. Do not add a slash at the end of the string.

With this option it is possible to define a output folder for all externalized `tikzpictures`. The folder location is set relative to the directory of the main `tex`-file.

```
\usepackage[outputfolder=$FOLDERNAME$]{stmtikzexternalization}
```

The default is `outputfolder=ZZZ_TikZ`.

**Option *globaleexternalization*** This is a boolean option. Expected values are either `true` or `false`.

By default externalization is not enabled for `tikzpictures` globally, meaning automatically activated for each `tikzpicture`. It has to be activated explicitly in the document with `\tikzexternalenable`.

It is possible to control this behavior with

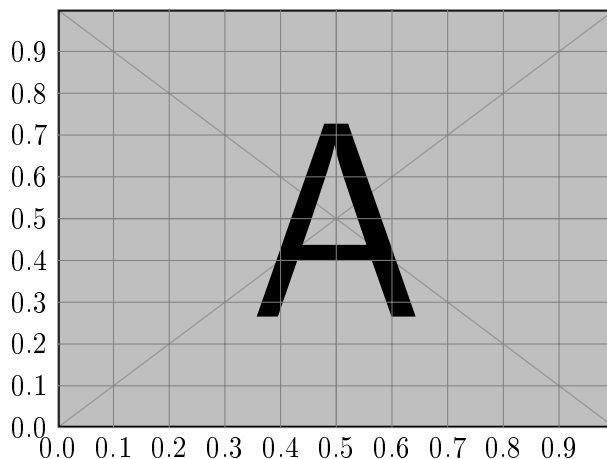
```
\usepackage[globaleexternalization=true|false]{stmtikzexternalization}
```

`globaleexternalization=false` is the default. It is used in case `globaleexternalization=true` is not set explicitly.

Global externalization is active until the next `\tikzexternaldisable` in your document.

## 2. Externalization

This is a test for the externalization of a `tikzpicture`.



### 3. Known issues

misplaced `\printindex` **error**.

- There is an issue with the externalization of `tikzpictures` in case the `imakeidx` package is used.
- There are two possibilities:
  1. Load the `imakeidx` before any call to `stmtikzexternalization`

```
\usepackage{imakeidx}
\usepackage[externalization=true]{stmtikz}
```
  2. Load the package without externalization and load the feature after the call to `imakeidx`

```
\usepackage[externalization=false]{stmtikz}
\usepackage{imakeidx}
\usepackage{stmtikzexternalization}
```

## A. The code

### A.1. stmtikz.sty

```
1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to all stm tikz definitions
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikz}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft
15 %
16 % Contact:   Martin Raedel, martin.raedel@dlr.de
17 %               DLR Lightweight Systems
18 %
19 %               _ _/ | _ _
20 %               / _/ _/ _/
21 %               www.dlr.de/sy/en   | / DLR
22 %
23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
33 %   comment about what it's used for
34
35 \ProvidesPackage{stmtikz}[2023/02/12 STMs custom LaTeX tikz definitions]
36
37 % -----
38 % Options
39 % -----
40
41 % For options
```

```

40 \@ifpackageloaded{kvoptions}{\RequirePackage{kvoptions}}%
41
42 % Option group
43 \SetupKeyvalOptions{%
44   family=stmtikz,%
45   prefix=stmtikz@,%
46   setkeys=\kvsetkeys,%
47 }
48
49 % Libraries
50 \DeclareBoolOption[true]{libraries}
51
52 % Styles
53 \DeclareBoolOption[true]{styles}
54
55 % Externalization
56 \DeclareBoolOption[true]{externalization}
57
58 % Global externalization
59 \DeclareBoolOption[false]{globalexternalization}
60
61 % Output folder
62 \DeclareStringOption[ZZZ_TikZ]{externalizationoutputfolder}
63
64 % Process options
65 \ProcessKeyvalOptions{stmtikz}
66
67 % -----
68 % Modules
69 % -----
70
71 % Load the base package
72 \@ifpackageloaded{stmtikzbase}{\%
73   \RequirePackage{stmtikzbase}%
74 }%
75
76 % Libraries
77 \ifstmtikz@libraries
78   \RequirePackage{stmtikzlibraries}
79 \fi
80
81 % Styles
82 \ifstmtikz@styles
83   \RequirePackage{stmtikzstyles}

```

```

84 \fi
85
86 % Externalization
87 \ifstmtikz@externalization
88   \@ifpackageloaded{stmtikzexternalization}{\{
89     \RequirePackage[%
90       outputfolder=\stmtikz@externalizationoutputfolder,
91       global={\ifstmtikz@globalexternalization true\else false\fi}
92     ]{stmtikzexternalization}
93   }
94 \fi
95
96 %%%%%%%%%%%
97 % That's it %
98 %%%%%%%%%%%
99
100 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
    this file. LaTeX will ignore anything after this line.
101 \endinput

```

## A.2. stmtikzbase.sty

```

1 %%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%
4 %
5 % This is a interface to stm base tikz package
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikzbase}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft
15 %
16 % Contact:   Martin Raedel, martin.raedel@dlr.de
17 %           DLR Lightweight Systems
18 %
19 %           __/|__
20 %           /_/_/_/
21 %           www.dlr.de/sy/en   | / DLR
22 %

```



```

23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
26 % Content %
27 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
    comment about what it's used for
33 \ProvidesPackage{stmtikzbase}[2023/02/12 STMs custom LaTeX tikz
    definitions]
34
35 % -----
36 % Package
37 % -----
38
39 \@ifpackageloaded{tikz}{\RequirePackage{tikz}}%
40
41 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
42 % That's it %
43 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
44
45 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
    this file. LaTeX will ignore anything after this line.
46 \endinput

```

### A.3. stmtikzlibraries.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This file includes unit definitions.
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikzlibraries}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft

```

```

15 %
16 % Contact:   Martin Raedel,   martin.raedel@dlr.de
17 %           DLR Lightweight Systems
18 %
19 %           _ _/|_ _
20 %           /_/_/_/_/
21 %           www.dlr.de/sy/en   | / DLR
22 %
23 % Copyright (C) 2019-... DLR Lightweight Systems
24 %
25 %%%%%%%%%%%
26 % Content                                     %
27 %%%%%%%%%%%
28
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
   comment about what it's used for
33 \ProvidesPackage{stmtikzlibraries}[2023/02/12 STMs custom LaTeX tikz
   library definitions]
34
35 % -----
36 % Package
37 % -----
38
39 \@ifpackageloaded{tikz}{\RequirePackage{tikz}}%
40
41 % -----
42 % Libraries
43 % -----
44
45 \usetikzlibrary{arrows.meta}
46 \usetikzlibrary{backgrounds}
47 \usetikzlibrary{calc}
48 \usetikzlibrary{decorations.markings}
49 \usetikzlibrary{decorations.text}
50 \usetikzlibrary{fit}
51 \usetikzlibrary{intersections}
52 \usetikzlibrary{tikzmark}
53 \usetikzlibrary{trees}
54 \usetikzlibrary{matrix}
55 \usetikzlibrary{mindmap}
56 \usetikzlibrary{patterns}

```

```

57 \usetikzlibrary{positioning}
58 \usetikzlibrary{shadows}
59 \usetikzlibrary{shadows.blur}
60 \usetikzlibrary{shapes}
61 \usetikzlibrary{shapes.misc}
62 \usetikzlibrary{spy}
63
64 % -----
65 % Pgfmath
66 % -----
67
68 % Stuff for calc compatiability.
69 \let\real=\pgfmath@calc@real
70 \let\minof=\pgfmath@calc@minof
71 \let\maxof=\pgfmath@calc@maxof
72 \let\ratio=\pgfmath@calc@ratio
73 \let\widthof=\pgfmath@calc@widthof
74 \let\heightof=\pgfmath@calc@heightof
75 \let\depthof=\pgfmath@calc@depthof
76
77 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
78 % That's it %
79 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
80
81 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
   this file. LaTeX will ignore anything after this line.
82 \endinput

```

#### A.4. stmtikzstyles.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to all stm tikz definitions
6 % Based upon the tikz package:
7 %   https://ctan.org/pkg/tikz
8 %
9 % Usage
10 % - Preamble:
11 %   - \usepackage{stmtikzstyles}
12 %
13 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>
14 %               Initial draft

```

```

15 %
16 % Contact:   Martin Raedel,   martin.raedel@dlr.de
17 %           DLR Lightweight Systems
18 %
19 %
20 %           _ _/_/_
21 %           / _/_/_/
22 %           www.dlr.de/sy/en   | / DLR
23 %
24 %
25 % Copyright (C) 2019-... DLR Lightweight Systems
26 %
27 % Content
28 %
29 % Declare that this style file requires at least LaTeX version 2e.
30 \NeedsTeXFormat{LaTeX2e}
31
32 % Provide the name of your page, the date it was last updated, and a
33 % comment about what it's used for
34 \ProvidesPackage{stmtikzstyles}[2023/02/12 STMs custom LaTeX tikz style
35 % definitions]
36 %
37 % Package
38 %
39 \@ifpackageloaded{tikz}{}{\RequirePackage{tikz}}%
40 \@ifpackageloaded{stmcolors}{}{\RequirePackage{stmcolors}}%
41 %
42 % Pgfkkeys
43 %
44 % From the pgf manual 2.10csv page 694:
45 %
46 % It should be noted that all calculations must not exceed
47 % +-16383.99999 at any point, because the underlying computations rely
48 % on TeX dimensions. This means that many of the underlying computations
49 % are necessarily approximate and that in addition, are not very fast.
50 % TeX is, after all, a typesetting language and not ideally suited to
    relatively advanced mathematical operations. However, it is possible
    to change the computations as described in Section 76.

```

```

51 %
52 %     16383.99998pt (TeX's largest dimen)
53 %
54 % In Notes On Programming in TeX Chirstian Feuersaenger pointed out
55 %
56 %     The \dimen registers perform their arithmetic's internally with 32
    bit scaled integers, so called scaled point with unit sp. It holds 1pt
    = 65536sp = 216sp. One of the 32 bits is used as sign. The total
    number range in pt is  $[-(2^{30}-1)/2^{16}, (2^{30}-1)/2^{16}] = [-16383.9998, +16383.9998]1$ .
57 %
58 %     1 Please note that this does not cover the complete range of a 32
    bit integer, I do not know why
59 % \pgfkeys{/pgf/fpu=true}                                % Allow pgf to plot
    values larger than 16383.9998
60 % \tikzset{fpu}                                           % Allow pgf to plot
    values larger than 16383.9998
61
62 \pgfkeys{/tikz/savenumber/.code 2 args={\global\edef#1{#2}}}
63
64 % -----
65 % Styles
66 % -----
67
68 % Help grid for external images
69 % Call inside scope with: \pic{stmimagegrid};
70 \tikzset{%
71   stmimagegrid/.pic={%
72     \draw[help lines,xstep=.1,ystep=.1] (0,0) grid (1,1);%
73     \foreach \x in {0,1,...,9} {\node [anchor=north] at (\x/10,0) {0.\x};}%
74     \foreach \y in {0,1,...,9} {\node [anchor=east] at (0,\y/10) {0.\y};}%
75   }%
76 }
77
78 % Default arrow tip
79 \tikzset{
80   stmdefaultarrow/.style={                                % Define arrow style
81     >=Stealth,                                           % >=latex
82   }
83 }
84
85 % A cross for markings in plots

```

```

86 % https://tex.stackexchange.com/a/124064
87 \tikzset{%
88     cross/.style={%
89         cross out,%
90         draw,%
91         minimum size=2*(#1-\pgflinewidth),%
92         inner sep=0pt,%
93         outer sep=0pt,%
94     }%
95 }%
96
97 % Beamer overlay feature
98 % https://tex.stackexchange.com/a/146991/44634
99 \tikzset{%
100     invisible/.style={%
101         opacity=0,%
102         text opacity=0%
103     },%
104     visible on/.style={%
105         alt={%
106             #1{}\invisible}%
107         }%
108     },%
109     alt/.code args={<#1>#2#3}{%
110         \alt<#1>\pgfkeysalso{#2}\pgfkeysalso{#3}} % \pgfkeysalso doesn't
111         change the path
112     },
113 }
114 \tikzset{%
115     stmmarkuptext/.style={%
116         text=stmmarkupcolor,%
117     }%
118 }
119
120 % Markup style for rectangles on external figures
121 \tikzset{%
122     stmrectangularmarkup/.style={%
123         inner sep=0pt,% necessary for correct positioning of corners
124         draw=stmmarkupcolor,%
125         thick,%
126     }%
127 }
128

```

```

129 % Equal space decoration markers along addplot path
130 % http://tex.stackexchange.com/a/232010/44634
131 \tikzset{
132   nomorepostactions/.code={\let\tikz@postactions=\pgfutil@empty},
133   stmmark/.style 2 args={decoration={markings,
134     mark= between positions 0 and 1 step (1/11)*\pgfdecoratedpathlength
135     with{%
136       \tikzset{#2,every mark}\tikz@options
137       \pgfuseplotmark{#1}%
138     },
139     postaction={decorate},
140     /pgfplots/legend image post style={
141       mark=#1,
142       #2,
143       every path/.append style={nomorepostactions}
144     },
145   },
146 }
147
148 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
149 % That's it %
150 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
151
152 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
153 % this file. LaTeX will ignore anything after this line.
154 \endinput

```

#### A.5. stmtikzexternalization.sty

```

1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 % Header %
3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
4 %
5 % This is a interface to tikz externalization definitions.
6 % All TikZ output is written to 'ZZZ_TikZ' folder.
7 % Based upon the tikz package:
8 %   https://ctan.org/pkg/tikz
9 %
10 % Usage
11 %   - Preamble:
12 %     - \usepackage{stmtikzexternalization}
13 %
14 % Revisions: 2019-10-27 Martin Raedel <martin.raedel@dlr.de>

```

```

15 % Initial draft
16 %
17 % Contact: Martin Raedel, martin.raedel@dlr.de
18 % DLR Lightweight Systems
19 %
20 %          _ _/|_ _
21 %          / _/_/_/_/
22 %          www.dlr.de/sy/en      | / DLR
23 %
24 % Copyright (C) 2019-... DLR Lightweight Systems
25 %
26 %%%%%%%%%%%
27 % Content %
28 %%%%%%%%%%%
29
30 % Declare that this style file requires at least LaTeX version 2e.
31 \NeedsTeXFormat{LaTeX2e}
32
33 % Provide the name of your page, the date it was last updated, and a
    comment about what it's used for
34 \ProvidesPackage{stmtikzexternalization}[2023/02/12 STMs custom LaTeX
    tikz externalization definitions]
35
36 % -----
37 % Package
38 % -----
39
40 \@ifpackageloaded{tikz}{\RequirePackage{tikz}}%
41
42 % -----
43 % Options
44 % -----
45
46 % Options package
47 \@ifpackageloaded{kvoptions}{\RequirePackage{kvoptions}}%
48
49 % Option group
50 \SetupKeyvalOptions{%
51   family=stmtikzexternalization,%
52   prefix=stmtikzexternalization@,%
53   setkeys=\kvsetkeys,%
54 }
55
56 % Externalization

```



```

57 \DeclareBoolOption[false]{global}
58
59 % Output folder
60 \DeclareStringOption[ZZZ_TikZ]{outputfolder}
61
62 % Process options
63 \ProcessKeyvalOptions{stmtikzexternalization}
64
65 % -----
66 % Libraries
67 % -----
68
69 \usetikzlibrary{external}
70
71 % -----
72 % Settings
73 % -----
74
75 \tikzexternalize[%
76   mode=convert with system call,%
77   shell escape=-enable-write18,% % Use for MiKTeX
78 ]
79
80 % Output folder
81 \tikzsetexternalprefix{\stmtikzexternalization@outputfolder/}
82
83 % Set
84 \tikzset{%
85   external/system call={%
86     pdflatex \tikzexternalcheckshellescape -halt-on-error %
87     -interaction=batchmode -jobname "\image" "\texsource" %&& %
88     %convert -density 600 -transparent white "\image.pdf" "\image.png" %
89     %magick -density 600 -transparent white "\image.pdf" "\image.png" %
90     for ImageMagick versions <7
91     %magick -density 600 -transparent white "\image.pdf" "\image.png" %
92     for ImageMagick versions >= 7
93   }
94 }
95
96 % By default, do not allow global externalization
97 \ifstmtikzexternalization@global
98   \tikzexternalenable
99 \else
100   \tikzexternaldisable
101 \fi

```

```

99
100 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
101 % That's it %
102 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
103
104 % Finally, we'll use \endinput to indicate that LaTeX can stop reading
    this file. LaTeX will ignore anything after this line.
105 \endinput

```