

Description of the module Fancy Theorems

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Abstract

With the module *Fancy Theorems* you can modify all the theorems layouts output appearance (except the proof and case layouts), using a key-val syntax much like in `thmtools`. All the theorems environments are defined using the \LaTeX package **fancythm**, which rely heavily on the \LaTeX package **thmtools**. It is recommended to read some of **thmtools** documentation.

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1. Preparation

1.1. Installation

Firstly, manually install the `fancythm` package. The installation procedure is dependent on your \LaTeX distribution, so I won't explain how to do so here (it will probably just require you to copy the `fancythm` folder to some directory, and then tell your latex \LaTeX distribution that you added a new folder to its directories).

To install the module *Fancy Theorems*, move the file `fancythm.module` to the layouts folder in LyX's user directory (which can be found in **Help**▷**About Lyx.**). After that reconfigure LyX via **Tools**▷**Reconfigure**, and restart LyX.

! Note that the \LaTeX package `fancythm` requires the packages `amsthm`, `thmtools` and `multicols`. If the `templates` option is used, `fancythm` loads the tikz library `decorations.pathmorphing`, `varwidth`, and `tclockbox` with the `most` option. It is recommended to check that all of these packages are installed.

1.2. Loading The Module

At first load the module *Fancy Theorems* in the document settings of your file, via **Documents**▷**Settings**▷**Modules**.

If you want to use the `templates` option, write “templates” in the document class options in the document settings of your file.

2. Basics

2.1. Designing Theorems

Suppose you would like to state the Pythagorean theorem in your document. To do so, go to LyX's environment selection combobox, select the Theorem layout and write the theorem's content (if you would to write an optional note, go to **Insert**▷**Optional Note**, or press **Alt+A 1**).

Theorem 2.1 (Pythagoras). *In any right triangle, the area of the square whose side is the hypotenuse (the side opposite the right angle) is equal to the sum of the areas of the squares whose sides are the two legs (the two sides that meet at a right angle).*

To change the appearance of the theorems in the output PDF file insert the **Set Keys** layout via **Insert**▷**Custom Insets**▷**Set Keys**, in the argument inset (called `envs`) write a comma separated list of all the environments names that you want to change (for a list of all the environments names see [subsection 3.2](#)), and in the inset itself write the keys with the appropriate values. For example, we will change the note braces to be square brackets, we will add a symbol to mark the end of the theorem and add more vertical space before the theorem.

Now we should be able to see the changes in all the following theorems (with environment name `thm`).

Theorem 2.2 [Pythagoras]. *In any right triangle, the area of the square whose side is the hypotenuse (the side opposite the right angle) is equal to the sum of the areas of the squares whose sides are the two legs (the two sides that meet at a right angle).* ★

! The latex command of that layout is `\setfancymkeys{<envs>}{<key=val>}`, where `<envs>` is a comma separated list of all the environments names that you want to change, and `<key=val>` is a comma separated list of the keys you want to change. In addition, `<envs>` accepts the keywords **all**, **reg**, and **strd** to apply the changes to all environments, all the unstarred variants, or all the starred variants.

The following diagram¹ demonstrates some of the possible theorems keys.

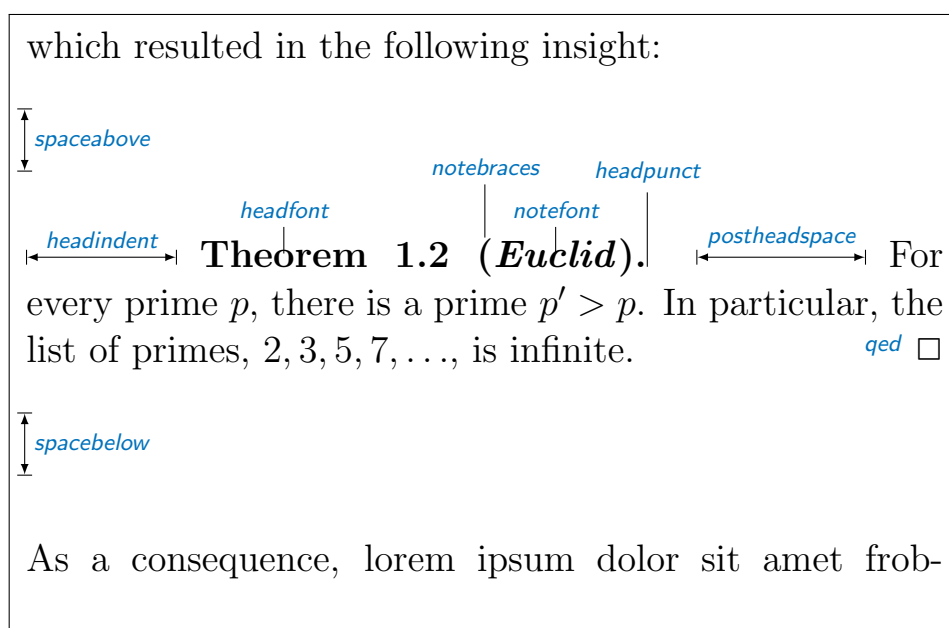


Figure: Settable parameters of a theorem style.

For a full list of keys and their description, see [subsection 3.1](#).

There is an option to use preview box (via **Insert**▷**Preview**) with the theorems layouts, but, to see the changes that you applied you need to include the **Set Keys** layout in the preview box, or, set the keys in the preamble (and make sure that **Tools**▷**Preference**▷**Look & Feel**▷**Display**▷**Instant Preview** is on).

! For example, this paragraph is written with the **Remark*** layout (its keys are set in the preamble) inside a preview box.

2.2. The templates Option

Using the **templates** option gives you access to predefined styles for theorems. To use them, insert the **Set Keys** layout, as before, and in the keys list write a name of one of the styles. For example, here is a theorem with the **fancycolorcoded** style (for a full list of styles see [subsection 3.4](#))

¹Credit to thmtools

Theorem 2.3 (Pythagoras). *In any right triangle, the area of the square whose side is the hypotenuse (the side opposite the right angle) is equal to the sum of the areas of the squares whose sides are the two legs (the two sides that meet at a right angle).*

2.3. List of Theorems

To print a list of theorems go to LyX's environment selection combobox, select the List of Theorems layout, and set the keys in the keys inset. Here are two short examples:

List of Theorems

2.1. Theorem (Pythagoras)	2
2.2. Theorem (Pythagoras)	3
2.3. Theorem (Pythagoras)	4

Now I will change the list format with the swapnumber key, and change the title with the title key

My Title

Theorem 2.1 (Pythagoras)	2
Theorem 2.2 (Pythagoras)	3
Theorem 2.3 (Pythagoras)	4

For a full list of keys and their description, see [subsection 3.3](#).

3. Detailed Information

In the following section, if a key description is titled in violet color, it is similar to a key from `thmtools`, if it is green, it's a new key defined in `fancythm`.

3.1. Theorems Keys

- headfont** **Value: `TEX` code.** Executed just before the head of the theorem is typeset, inside a group. Intended use it to put font switches here.
- notefont** **Value: `TEX` code.** Executed just before the note in the head is typeset, inside a group. Intended use it to put font switches here. Formatting also applies to the braces around the note.
- bodyfont** **Value: `TEX` code.** Executed before the begin part of the theorem ends, but before all afterheadhooks. Intended use it to put font switches here.

headpunct **Value:** **T_EX** code, usually a single character. Put at the end of the theorem’s head, prior to linebreaks or indents.

headformat **Value:** **L^AT_EX** code, using the special placeholders `\NUMBER`, `\NAME` and `\NOTE`, which correspond to the (formatted, including the braces for `\NOTE` etc.) three parts of a theorem’s head. This can be used to override the usual style “1.1 Theorem (Foo)”, for example to let the numbers protrude in the margin or put them after the name.

! • The **headformat** key does not accept the keywords **margin** and **swapnumber** as it would with **thmtools**

postheadspace **Value:** **a length or a glue (with units).** Horizontal space inserted after the entire head of the theorem, before the body. Does probably not apply (or make sense) for styles that have a line-break after the head.

headindent **Value:** **a length or a glue (with units).** Horizontal space inserted before the head. Some publishers like `\parindent` here for remarks, for example.

title **Value:** **T_EX** code. The title of the theorem.

name Same as **title**

heading same as **title**

preheadhook **Value:** **L^AT_EX** code. This code will be executed at the beginning of the environment, even before vertical spacing is added and the head is typeset. However, it is already within the group defined by the environment.

postheadhook **Value:** **L^AT_EX** code. This code will be executed after the call to the original `begin-theorem` code. Note that all backends seem to delay typesetting the actual head, so code here should probably enter horizontal mode to be sure it is after the head, but this will change the spacing/wrapping behaviour if your body starts with another list.

prefoothook **Value:** **L^AT_EX** code. This code will be executed at the end of the body of the environment.

postfoothook **Value:** **L^AT_EX** code. This code will be executed at the end of the environment, even after eventual vertical spacing, but still within the group defined by the environment.

refname	Value: one string, or two strings separated by a comma (no spaces). This is the name of the theorem as used by <code>\autoref</code> , <code>\cref</code> and friends. If it is two strings, the second is the plural form used by <code>\cref</code> . Default value is the value of name .
leftnotebrace	Value: one character, the opening symbol to use around a theorem's note.
rightnotebrace	Value: one character, the closing symbol to use around a theorem's note.
spaceabove	Value: a length or a glue (with units). Vertical space above the theorem, possibly discarded if the theorem is at the top of the page.
spacebelow	Value: a length or a glue (with units). Vertical space after the theorem, possibly discarded if the theorem is at the top of the page.
qed	Value: one character, the closing mark of the theorem (as with proof and <code>\qedsymbol</code>).
parent	Value: a counter name. The theorem will be reset whenever that counter is incremented. Usually, this will be a sectioning level, chapter or section . If the input is not a counter name, the theorem will become independent.
numberwithin	Same as parent .
within	Same as parent .
numbered	Value: one of the keywords yes or no. The theorem will be numbered, or not numbered.
sibling	Value: a counter name. The theorem will use this counter for numbering. Usually, this is the name of another theorem environment. If the input is not a counter name, the theorem will become independent.
numberlike	Same as sibling .
sharenumber	Same as sibling .

! The following keys are not supported: `style`, `Refname`, `shaded`, `thmbox`, `,notebraces` (replaced with `leftnotebrace` and `rightnotebrace`), `mdframed`.

3.2. Layouts Information

Environment Name	Layout Name	Default title	Default headfont	Default bodyfont
thm	Theorem	Theorem	\bfseries	\itshape
thm*	Theorem*	Theorem	\bfseries	\itshape
cor	Corollary	Corollary	\bfseries	\itshape
cor*	Corollary*	Corollary	\bfseries	\itshape
lem	Lemma	Lemma	\bfseries	\itshape
lem*	Lemma*	Lemma	\bfseries	\itshape
prop	Proposition	Proposition	\bfseries	\itshape
prop*	Proposition*	Proposition	\bfseries	\itshape
conjecture	Conjecture	Conjecture	\bfseries	\itshape
conjecture*	Conjecture*	Conjecture	\bfseries	\itshape
fact	Fact	Fact	\bfseries	\itshape
fact*	Fact*	Fact	\bfseries	\itshape
defn	Definition	Definition	\bfseries	\mdseries
defn*	Definition*	Definition	\bfseries	\mdseries
example	Example	Example	\bfseries	\mdseries
example*	Example*	Example	\bfseries	\mdseries
problem	Problem	Problem	\bfseries	\mdseries
problem*	Problem*	Problem	\bfseries	\mdseries
xca	Exercise	Exercise	\bfseries	\mdseries
xca*	Exercise*	Exercise	\bfseries	\mdseries
sol	Solution	Solution	\bfseries	\mdseries
sol*	Solution*	Solution	\bfseries	\mdseries
rem	Remark	Remark	\itshape	<empty>
rem*	Remark*	Remark	\itshape	<empty>
claim	Claim	Claim	\itshape	<empty>
claim*	Claim*	Claim	\itshape	<empty>

Table: Names and default fonts of the environments

headpunct={.}	postheadspace=1em	headindent=0pt
preheadhook=<empty>	postheadhook=<empty>	prefoothook=<empty>
postfoothook=<empty>	rightnotebrace=)	leftnotebrace=(
spaceabove=6pt	spacebelow=6pt	numberwithin=section
sibling=<empty>	qed=<empty>	notefont=<empty>
refname=theorems title numbered=true/false (unstarred/starred) headformat=\NAME\ \NUMBER\NOTE/ \NAME\NOTE (unstarred/starred)		

Table: Default keys values

3.3. List of Theorems Keys

title	Value: title of \listoftheorems. The default is stored in the macro \listtheoremname and is initially “List of Theorems”.
ignore	Value: comma seperated list of theorem environment names. Filter out things by environment names. Default value is list of all defined theorem environments.
ignoreall	Ignore every theorem environment. This key is usually followed by keys show and onlynamed.
show	Value: comma seperated list of theorem environment names. Leave theorems that belong to specified list and filter out others. Default value is list of all defined theorem environments.
showall	The opposite effect of ignoreall.
onlynamed	Value: comma seperated list of theorem environment names. Leave things that are given an optional argument and belong to specified list, and filter out others. Default value is list of all defined theorem environments.
swapnumber	Value: true or false. If set to true, numbers will appear after the theorem name in the list. Initially false and default value is true.
numwidth	Value: a length or a glue (with units). If swapnumber=false, the theorem number is typeset in a box of of width numwidth. Initially 1.5pc for AMS classes and 2.3em for others.
columns	Value: a positive integer. If set to an integer bigger than 1, the list of theorems will be printed in a multicol environment with number of columns as the input.

notitle **Value:** **true or false.** Is set to true, the list of theorems will print with no title. Initially false.

3.4. Keys - templates option

The following is the full list of styles defined with the **templates** option:

default, named, colorcoded, fancycolorcoded, thmbox, margins, tcb, tcbribbon, tcbdiamond, and bclogo.

! Actually, the keys default, named, and margins are defined in the basic module (without the **templates** option).

To use each of these styles, write it's name in the key list in the **Set Keys** layout. Non of these keys accept value, except margins which accepts a length which represent the distance from the title to the body of the theorem, and thmbox which can get three values: S, M, L (for small, medium and large).

To see all the styles of all the layouts see the file **test_fancythm.pdf**.

In addition to all the style keys, the **template** option adds three additional keys:

color **Value:** **name of a defined color color, or a mix of several, using xcolor syntax.** It will define the color of all the styles related to the theorem.

beginstyle **Value:** **L^AT_EX code.** This code will be executed at the beginning of the environment, but after vertical spacing is added and the head is typeset.

endstyle **Value:** **L^AT_EX code.** This code will be executed at the end of the environment, but before eventual vertical spacing.

4. Support for Bilingual And RTL Documents

4.1. RTL Documents

As this module uses **amsthm**, it is recommended to compile RTL files that includes the Fancy Theorem module with XeLaTeX and polyglossia, as there are known issues with babel and amsthm. Also, all the non-symmetric styles defined in the **templates** option will not display correctly, unless the **bidi** package is used.

4.2. Bilingual Documents

the module will support different fonts for different languages in the theorems environments by default if you use polyglossia, otherwise there would be a need to specify it manually with the relevant font keys.

A. Documentation of fancythm

this section is incomplete and will be uploaded soon.

A.1. Initialization

```
1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{fancythm}[2022/10/13]
3
4 \RequirePackage{amsthm}
5 \RequirePackage{thmtools}
```

A.2. Keys

```
6 \RequirePackage{keyval}
7
8 \def\define@fancythm@key#1#2{%
9     \define@key{fancythm@#1}{#2}{%
10         \@xa\gdef\csname fancythm@#1@#2\endcsname{##1}%
11     }%
12 }
13
14 \def\define@fancythm@title#1{%
15     \@for\env:={title,name,heading}\do{%
16         \@expandtwoargs\define@key{fancythm@#1}{\env}{%
17             \@xa\gdef\csname fancythm@#1@title\endcsname{##1}%
18         }%
19     }%
20 }
21
22 \def\define@fancythm@numbered#1{%
23     \define@key{fancythm@#1}{numbered}[true]{%
24         \def\fancythm@bool{##1}%
25         \ifx\fancythm@bool\thmt@TRUE
26             \@xa\gdef\csname the#1\endcsname{\@arabic{\csname c@#1
27                 \endcsname}}%
28             \global\@namedef{fancythm@#1@space}{\space}%
29         \else
30             \ifx\fancythm@bool\thmt@FALSE
31                 \@xa\gdef\csname the#1\endcsname{}%
32                 \@xa\gdef\csname #1space\endcsname{}%
33             \else
34                 \PackageError{fancythm}{Unknown value '##1' to key
35                     numbered}{}%
36             \fi
37         \fi
38     }%
39 }
40
41 \def\fancythm@counters#1#2{%
```

```

40 \ifcsname c@#2\endcsname
41 \begingroup
42 \def\@elt##1{\counterwithout{#1}{##1}}%
43 \cl@@ckpt
44 \counterwithin{#1}{#2}%
45 \endgroup
46 \setcounter{#1}{0}%
47 \else
48 \begingroup
49 \def\@elt##1{\counterwithout{#1}{##1}}%
50 \cl@@ckpt
51 \endgroup
52 \setcounter{#1}{0}%
53 \fi
54 }
55
56 \def\define@fancythm@numberwithin#1{%
57 \@for\env:={numberwithin,within,parent}\do{%
58 \@expandtwoargs\define@key{fancythm@#1}{\env}[]{%
59 \fancythm@counters{#1}{##1}%
60 }%
61 }%
62 }
63
64 \def\define@fancythm@sibling#1{%
65 \@for\env:={sibling,numberlike,sharenumber}\do{%
66 \@expandtwoargs\define@key{fancythm@#1}{\env}[]{%
67 \ifundefined{c@fancythm@#1}{%
68 \newcounter{fancythm@#1}%
69 \@xa\global\@xa\let\csname c@fancythm@#1\@xa\endcsname
\csname c@#1\endcsname
70 }{}%
71 \ifcsname c@##1\endcsname
72 \@xa\global\@xa\let\csname c@#1\@xa\endcsname\csname c@
##1\endcsname
73 \else
74 \@xa\global\@xa\let\csname c@#1\@xa\endcsname\csname
c@fancythm@#1\endcsname
75 \setcounter{#1}{0}%
76 \fi
77 }%
78 }%
79 }
80
81 \def\define@fancythm@keyfamily#1{%
82 \define@fancythm@key{#1}{headfont}%
83 \define@fancythm@key{#1}{notefont}%
84 \define@fancythm@key{#1}{bodyfont}%
85 \define@fancythm@key{#1}{headpunct}%
86 \define@fancythm@key{#1}{headformat}%

```

```

87 \define@fancythm@key{#1}{postheadspace}%
88 \define@fancythm@key{#1}{headindent}%
89 \define@fancythm@title{#1}%
90 \define@fancythm@key{#1}{preheadhook}%
91 \define@fancythm@key{#1}{postheadhook}%
92 \define@fancythm@key{#1}{prefoothook}%
93 \define@fancythm@key{#1}{postfoothook}%
94 \define@fancythm@key{#1}{refname}%
95 \define@fancythm@key{#1}{leftnotebrace}%
96 \define@fancythm@key{#1}{rightnotebrace}%
97 \define@fancythm@key{#1}{spaceabove}%
98 \define@fancythm@key{#1}{spacebelow}%
99 \define@fancythm@key{#1}{qed}%
100 \define@fancythm@numberwithin{#1}%
101 \define@fancythm@numbered{#1}%
102 \define@fancythm@sibling{#1}%
103 }
104
105 \def\setfancythmkeys#1#2{%
106 \def\fancythm@templst{#1}%
107 \@expandtwoargs\in@{,all,}{, \fancythm@templst,} \ifin@
108 \ifx \fancythm@envs \@gobble \else
109 \@for \fam:=\fancythm@envs \do{%
110 \setkeys{fancythm@\fam}{#2}%
111 }%
112 \fi
113 \@expandtwoargs\@removeelement{all}\fancythm@templst
114 \fancythm@templst
115 \fi
116 \@expandtwoargs\in@{,reg,}{, \fancythm@templst,} \ifin@
117 \ifx \fancythm@regenvs \@gobble \else
118 \@for \fam:=\fancythm@regenvs \do{%
119 \setkeys{fancythm@\fam}{#2}%
120 }%
121 \fi
122 \@expandtwoargs\@removeelement{reg}\fancythm@templst
123 \fancythm@templst
124 \fi
125 \@expandtwoargs\in@{,strd,}{, \fancythm@templst,} \ifin@
126 \ifx \fancythm@strdenvs \@gobble \else
127 \@for \fam:=\fancythm@strdenvs \do{%
128 \setkeys{fancythm@\fam}{#2}%
129 }%
130 \fi
131 \@expandtwoargs\@removeelement{strd}\fancythm@templst
132 \fancythm@templst
133 \fi
134 \ifx \fancythm@templst \@empty \else
135 \@for \fam:=\fancythm@templst \do{%
136 \ifcsname fancythm@#1@title \endcsname

```

```

134         \setkeys{fancythm@\fam}{#2}%
135     \fi
136 }%
137 \fi
138 }

```

A.3. Defaults

```

139 \def\fancythm@lang@font{}
140
141 \AtBeginDocument{%
142     \@ifundefined{language}{\relax}%
143     \def\fancythm@lang@font{\csname\language font\endcsname}%
144 }%
145 \@ifpackageloaded{hyperref}{%
146     \newcounter{@fancythm@hyperref}% a dummy counter for correct
147     \addtotheorempreheadhook{\stepcounter{@fancythm@hyperref}}%
148     }{}%
149 }
150
151 \def\define@fancythm@defaults#1#2{%
152     \define@key{fancythm@#1}{default}{\relax}{%
153         \setkeys{fancythm@#1}{%
154             headformat=\csname #1title\endcsname\NUMBER\NOTE,
155             notefont=\normalfont\fancythm@lang@font,
156             headpunct={.},
157             postheadspace=1em,
158             headindent=0pt,
159             preheadhook=,
160             postheadhook=,
161             prefoothook=,
162             postfoothook=,
163             rightnotebrace=),
164             leftnotebrace=(,
165             spaceabove=6pt,
166             spacebelow=6pt,
167             qed=,
168             #2
169         }%
170         \@xa\gdef\csname fancythm@#1@beginstyle\endcsname{}
171         \@xa\gdef\csname fancythm@#1@endstyle\endcsname{}
172     }%
173     \define@key{fancythm@#1}{named}{\relax}{%
174         \setkeys{fancythm@#1}{%
175             default,
176             headformat={\def\thmt@space{}\NOTE},
177             notefont=\bfseries,
178             bodyfont=\itshape,
179             rightnotebrace=,
180             leftnotebrace=,

```

```

181         numbered=false
182     }%
183 }%
184 \define@key{fancythm@#1}{margins}[1.3in]{%
185     \setkeys{fancythm@#1}{%
186         default ,
187         headformat={\def\thmt@space{} \llap{\smash{\parbox[t]{##1}{
188             \centering \csname #1title\endcsname \ \NUMBER}}}\NOTE},
189         headfont=\bfseries ,
190         notefont=\bfseries ,
191         bodyfont=\upshape ,
192         headpunct=,
193         postheadspace=0pt ,
194         rightnotebrace=. \hspace{1em} ,
195         leftnotebrace=,
196     }%
197 }

```

A.4. Theorems Deceleration

```

198 % three macros that holds the list of theorems ,
199 % unstarred theorems and starred theorems
200 % defined with \declarefancythm
201 \let \fancythm@envs \@gobble
202 \let \fancythm@regenvs \@gobble
203 \let \fancythm@strdenvs \@gobble
204
205 \newcommand{\declarefancythm}[5]{% #1 = env name, #2 = default keys, #3
    = default title, #4 = color, #5 = logo
206     \define@fancythm@keyfamily{#1}%
207     \global\@namedef{#1title}{\@nameuse{fancythm@#1@title}\@nameuse{
        fancythm@#1@space}}%
208     \setkeys{fancythm@#1}{title=#3}%
209     \setkeys{fancythm@#1}{refname=\csname fancythm@#1@title\endcsname}%
210     \AtBeginDocument{%
211         \@ifpackageloaded{hyperref}{%
212             \@xa\global\@xa\let\csname theH#1\endcsname
                \the@fancythm@hyperref
213         }{}%
214     }%
215     \define@fancythm@defaults{#1}{#2}%
216     \setkeys{fancythm@#1}{default}%
217     \declaretheoremstyle[%
218         headfont=\normalfont\fancythm@lang@font\csname fancythm@#1
            @headfont\endcsname ,
219         notefont=\normalfont\fancythm@lang@font\csname fancythm@#1
            @notefont\endcsname ,
220         bodyfont=\normalfont\fancythm@lang@font\csname fancythm@#1
            @bodyfont\endcsname ,
221         headpunct={\csname fancythm@#1@headpunct\endcsname} ,

```

```

222     headformat={\hspace*{\csname fancythm@#1@headindent\endcsname}
223         \csname fancythm@#1@headformat\endcsname},
224     notebraces={\csname fancythm@#1@leftnotebrace\endcsname}{\csname
225         fancythm@#1@rightnotebrace\endcsname},
226     postheadspace=\csname fancythm@#1@postheadspace\endcsname,
227     spaceabove=0pt,
228     spacebelow=0pt]{fancythm@#1}%
229 \declaretheorem[%
230     style=fancythm@#1,
231     title=\protect\csname fancythm@#1@title\endcsname,
232     preheadhook=\csname fancythm@#1@preheadhook\endcsname\vspace{
233         \csname fancythm@#1@spaceabove\endcsname}\csname fancythm@#1
234         @beginstyle\endcsname,
235     postheadhook=\csname fancythm@#1@postheadhook\endcsname,
236     prefoothook=\csname fancythm@#1@prefoothook\endcsname,
237     postfoothook=\csname fancythm@#1@endstyle\endcsname\vspace{
238         \csname fancythm@#1@spacebelow\endcsname}\csname fancythm@#1
239         @postfoothook\endcsname,
240     refname=\csname fancythm@#1@refname\endcsname,
241     qed=\csname fancythm@#1@qed\endcsname}{#1}%
242 \edef\fancythm@envs{\fancythm@envs,#1}%
243 \in@{*@\fancythm@strd}{#1@\fancythm@strd}\ifin@
244     \setkeys{fancythm@#1}{numberwithin=section,numbered=false}%
245     \edef\fancythm@strdenvs{\fancythm@strdenvs,#1}%
246 \else
247     \setkeys{fancythm@#1}{numbered=true,numberwithin=section}%
248     \edef\fancythm@regenvs{\fancythm@regenvs,#1}%
249 \fi
250 \if@fancythm@templates@
251     \colorlet{fancythm@#1@color}{#4}%
252     \@xa\def\csname fancythm@#1@logo\endcsname{\includegraphics[width
253         =17pt]{#5}}%
254     \define@fancythm@style{#1}%
255 \fi
256 }
257 \@onlypreamble\declarefancythm

```

A.5. List of Theorems

```

252 % new keys that supports a list with no title, and a list inside multicol
253 \RequirePackage{multicol}
254 \define@key{thmt-listof}{columns}[1]{\def\fancythm@listofthm@columns{#1}}
255
256 \newif\if@fancythm@notitle@
257 \define@key{thmt-listof}{notitle}[true]{%
258     \def\fancythm@bool{#1}%
259     \ifx\fancythm@bool\thmt@TRUE
260         \@fancythm@notitle@true
261     \else
262         \ifx\fancythm@bool\thmt@FALSE

```

```

263         \@fancythm@notitle@false
264     \else
265         \PackageError{fancythm}{Unknown value '#1' to key notitle}{}%
266     \fi
267 \fi
268 }
269
270 \def\fancythm@listofthm@columns{1}
271 % the new \thmt@mklistcmd check if
272 % a theorem was defined via \declarefancythm.
273 % if it is, the entry lable will be \fancythm@<envname>@title ,
274 % if not, it will execute the original definition
275 \renewcommand{\thmt@mklistcmd}{%
276     \ifcsname fancythm@\csname thmt@envname\endcsname @title\endcsname
277     \thmtlo@newentry
278     \ifthmt@isstarred
279         \@xa\def\csname ll@\thmt@envname\endcsname{%
280             \protect\ifthmt@listswap
281             \protect\else
282             \protect\numberline{\protect\let\protect\autodot\protect
283                 \@empty}%
284             \protect\fi
285             \csname fancythm@\csname thmt@envname\endcsname @title
286                 \endcsname
287             \ifx\@empty\thmt@shortoptarg\else\protect
288                 \thmtformatoptarg{\thmt@shortoptarg}\fi
289         }%
290     \else
291         \@xa\def\csname ll@\thmt@envname\endcsname{%
292             \protect\ifthmt@listswap
293             \csname fancythm@\csname thmt@envname\endcsname @title
294                 \endcsname~\csname the\thmt@envname\endcsname
295             \protect\else
296             \protect\numberline{\csname the\thmt@envname\endcsname}%
297             \csname fancythm@\csname thmt@envname\endcsname @title
298                 \endcsname
299             \protect\fi
300             \ifx\@empty\thmt@shortoptarg\else\protect
301                 \thmtformatoptarg{\thmt@shortoptarg}\fi
302         }%
303     \fi
304     \@xa\gdef\csname thmt@contentsline@\thmt@envname\endcsname{%
305         \thmt@contentslineShow
306     }%
307 \else
308     \thmtlo@newentry
309     \ifthmt@isstarred
310         \@xa\def\csname ll@\thmt@envname\endcsname{%
311             \protect\ifthmt@listswap
312             \protect\else

```



```

307         \protect\numberline{\protect\let\protect\autodot\protect
           \@empty}%
308     \protect\fi
309     \thmt@thmname
310     \ifx\@empty\thmt@shortoptarg\else\protect
           \thmtformatoptarg{\thmt@shortoptarg}\fi
311 }%
312 \else
313     \@xa\def\csname ll@\thmt@envname\endcsname{%
314         \protect\ifthmt@listswap
315         \thmt@thmname~\csname the\thmt@envname\endcsname
316         \protect\else
317         \protect\numberline{\csname the\thmt@envname\endcsname}%
318         \thmt@thmname
319         \protect\fi
320         \ifx\@empty\thmt@shortoptarg\else\protect
           \thmtformatoptarg{\thmt@shortoptarg}\fi
321     }%
322 \fi
323 \@xa\gdef\csname thmt@contentsline@\thmt@envname\endcsname{%
324     \thmt@contentslineShow
325 }%
326 \fi
327 }

```

B. Documentation of fancythm-styles

this section is incomplete and will be uploaded soon.

B.1. Initialization

```

328 \NeedsTeXFormat{LaTeX2e}
329 \ProvidesPackage{fancythm-styles}[2022/10/13]
330
331 \RequirePackage{varwidth}
332 \RequirePackage[most]{tcolorbox}
333 \usetikzlibrary{decorations.pathmorphing} % forbclogo
334
335 \tcbset{%

```

B.2. Tcbset

```

336     enhanced ,
337     breakable ,
338     sharp corners=all ,
339     top=0mm,
340     bottom=0mm,
341     left=0mm,
342     colback=white ,
343     colframe=white ,

```

```

344     colbacktitle=white,
345     coltitle=black,
346     attach boxed title to top right,
347     boxed title style={empty, size=minimal, bottom=1.5mm},
348     overlay unbroken ={
349         \draw (title.south east)--(title.south west);
350         \draw ([xshift=-3.5mm]frame.north east)|-%
351         (frame.south west)--(frame.north west);},
352     overlay first={
353         \draw (title.south east)--(title.south west);
354         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
355             frame.south east);
356         \draw (frame.north west)--(frame.south west);},
357     overlay middle={
358         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
359             frame.south east);
360         \draw (frame.north west)--(frame.south west);},
361     overlay last={
362         \draw ([xshift=-3.5mm]frame.north east)|-%
363         (frame.south west)--(frame.north west);},
364 },
365 fancythm@right@thmboxS/.style={fancythm@right@thmbox,
366     overlay unbroken ={
367         \draw (title.south east)--(title.south west);
368         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
369             frame.south east);},
370     overlay first={
371         \draw (title.south east)--(title.south west);
372         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
373             frame.south east);},
374     overlay middle={
375         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
376             frame.south east);},
377     overlay last={
378         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
379             frame.south east);},
380 },
381 fancythm@right@thmboxL/.style={fancythm@right@thmbox,
382     overlay unbroken ={
383         \draw (title.south west)--(title.south east);
384         \draw ([xshift=-3.5mm]frame.north east)|-([xshift=-15mm]frame
385             .south east);},
386     overlay first={
387         \draw (title.south east)--(title.south west);
388         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
389             frame.south east);},
390     overlay middle={
391         \draw ([xshift=-3.5mm]frame.north east)--([xshift=-3.5mm]
392             frame.south east);},
393     overlay last={

```

```

385         \draw ([xshift=-3.5mm] frame.north east) | - ([xshift=-15mm] frame
           .south east);},
386     },
387 fancythm@right@thmboxLQ/.style={fancythm@right@thmbox,
388     overlay unbroken={
389         \draw (title.south east)--(title.south west);
390         \draw ([xshift=-3.5mm] frame.north east) | - ([xshift=-15mm] frame
           .south east);
391         \node[anchor=west] at (frame.south west) {$\square$};},
392     overlay first={
393         \draw (title.south east)--(title.south west);
394         \draw ([xshift=-3.5mm] frame.north east) -- ([xshift=-3.5mm]
           frame.south east);},
395     overlay middle={
396         \draw ([xshift=-3.5mm] frame.north east) -- ([xshift=-3.5mm]
           frame.south east);},
397     overlay last={
398         \draw ([xshift=-3.5mm] frame.north east) | - ([xshift=-15mm] frame
           .south east);
399         \node[anchor=west] at (frame.south west) {$\square$};},
400     },
401 fancythm@left@thmbox/.style={fancythm@right@thmbox,
402     left=4mm, right=0mm,
403     attach boxed title to top left,
404     boxed title style={empty, size=minimal, bottom=1.5mm},
405     overlay unbroken={
406         \draw (title.south west)--(title.south east);
407         \draw ([xshift=3.5mm] frame.north west) | - %
408             (frame.south east)--(frame.north east);},
409     overlay first={
410         \draw (title.south west)--(title.south east);
411         \draw ([xshift=3.5mm] frame.north west) -- ([xshift=3.5mm] frame.
           south west);
412         \draw (frame.north east)--(frame.south east);},
413     overlay middle={
414         \draw ([xshift=3.5mm] frame.north west) -- ([xshift=3.5mm] frame.
           south west);
415         \draw (frame.north east)--(frame.south east);},
416     overlay last={
417         \draw ([xshift=3.5mm] frame.north west) | - %
418             (frame.south east)--(frame.north east);},
419     },
420 fancythm@left@thmboxS/.style={fancythm@left@thmbox,
421     overlay unbroken={
422         \draw (title.south west)--(title.south east);
423         \draw ([xshift=3.5mm] frame.north west) -- ([xshift=3.5mm] frame.
           south west);},
424     overlay first={
425         \draw (title.south west)--(title.south east);
426         \draw ([xshift=3.5mm] frame.north west) -- ([xshift=3.5mm] frame.

```

```

427         south west);},
428 overlay middle={
429     \draw ([xshift=3.5mm] frame.north west)--([xshift=3.5mm] frame.
430         south west);},
431 overlay last={
432     \draw ([xshift=3.5mm] frame.north west)--([xshift=3.5mm] frame.
433         south west);},
434 },
435 fancythm@left@thmboxL/.style={fancythm@left@thmbox,
436 overlay unbroken ={
437     \draw (title.south west)--(title.south east);
438     \draw ([xshift=3.5mm] frame.north west)|-([xshift=15mm] frame.
439         south west);},
440 overlay first={
441     \draw (title.south west)--(title.south east);
442     \draw ([xshift=3.5mm] frame.north west)--([xshift=3.5mm] frame.
443         south west);},
444 overlay middle={
445     \draw ([xshift=3.5mm] frame.north west)--([xshift=3.5mm] frame.
446         south west);},
447 overlay last={
448     \draw ([xshift=3.5mm] frame.north west)|-([xshift=15mm] frame.
449         south west);},
450 },
451 fancythm@left@thmboxLQ/.style={fancythm@left@thmbox,
452 overlay unbroken ={
453     \draw (title.south west)--(title.south east);
454     \draw ([xshift=3.5mm] frame.north west)|-([xshift=15mm] frame.
455         south west);
456     \node[anchor=east] at (frame.south east) {$\square$};},
457 overlay first={
458     \draw (title.south west)--(title.south east);
459     \draw ([xshift=3.5mm] frame.north west)--([xshift=3.5mm] frame.
460         south west);},
461 overlay middle={
462     \draw ([xshift=3.5mm] frame.north west)--([xshift=3.5mm] frame.
463         south west);},
464 overlay last={
465     \draw ([xshift=3.5mm] frame.north west)|-([xshift=15mm] frame.
466         south west);
467     \node[anchor=east] at (frame.south east) {$\square$};},
468 },
469 fancythm@tcribbon@left/.style={enhanced,breakable,
470 colback=black!5,
471 colframe=black!50,
472 boxrule=0.2mm,
473 attach boxed title to top left={xshift=1cm,yshift*=1mm-
474     \tcboxedtitleheight},
475 varwidth boxed title*=-3cm,
476 boxed title style={frame code={%

```

```

465 \path[fill=tcbcolback!30!black]
466 ([yshift=-1mm,xshift=-1mm]frame.north west)
467 arc[start angle=0,end angle=180,radius=1mm]
468 ([yshift=-1mm,xshift=1mm]frame.north east)
469 arc[start angle=180,end angle=0,radius=1mm];
470 \path[left color=tcbcolback!60!black,right color=tcbcolback!60!
      black,
471 middle color=tcbcolback!80!black]
472 ([xshift=-2mm]frame.north west) — ([xshift=2mm]frame.north east)
473 [rounded corners=1mm]— ([xshift=1mm,yshift=-1mm]frame.north east
      )
474 — (frame.south east) — (frame.south west)
475 — ([xshift=-1mm,yshift=-1mm]frame.north west)
476 [sharp corners]— cycle;
477 },
478 interior engine=empty,
479 },
480 extras middle and last pre={top=0mm}
481 },
482 fancythm@tcbribbon@right/.style={fancythm@tcbribbon@left,
483 attach boxed title to top right={xshift=-1cm,yshift*=1mm-
      \tcbboxedtitleheight},
484 boxed title style={frame code={%
485 \path[fill=tcbcolback!30!black]
486 ([yshift=-1mm,xshift=-1mm]frame.north west)
487 arc[start angle=0,end angle=180,radius=1mm]
488 ([yshift=-1mm,xshift=1mm]frame.north east)
489 arc[start angle=180,end angle=0,radius=1mm];
490 \path[left color=tcbcolback!60!black,right color=tcbcolback!60!
      black,
491 middle color=tcbcolback!80!black]
492 ([xshift=-2mm]frame.north west) — ([xshift=2mm]frame.north east)
493 [rounded corners=1mm]— ([xshift=1mm,yshift=-1mm]frame.north east
      )
494 — (frame.south east) — (frame.south west)
495 — ([xshift=-1mm,yshift=-1mm]frame.north west)
496 [sharp corners]— cycle;
497 },
498 interior engine=empty,
499 },
500 },
501 fancythm@tcb@diamond/.style={%
502 enhanced,breakable,attach boxed title to top center={%
503 yshift=-0.25mm-\tcbboxedtitleheight/2,yshifttext=2mm-
      \tcbboxedtitleheight/2},
504 boxed title style={boxrule=0.5mm,
505 frame code={ \path[tcb fill frame] ([xshift=-4mm]frame.west)
506 — (frame.north west) — (frame.north east) — ([xshift=4mm]frame
      .east)
507 — (frame.south east) — (frame.south west) — cycle; },

```

```

508         interior code={ \path[tcb fill interior] ([xshift=-2mm]interior.
            west)
509         — (interior.north west) — (interior.north east)
510         — ([xshift=2mm]interior.east) — (interior.south east) — (
            interior.south west)
511         — cycle;}}
512     },
513     fancythm@colorcoded@right/.style={%
514         enhanced,breakable,frame hidden,
515         boxrule=0pt,rightrule=3pt,boxsep=0pt,sharp corners,
516         left=0pt,right*=10pt,top=0mm,bottom=0mm,
517     },
518     fancythm@colorcoded@left/.style={%
519         fancythm@colorcoded@right,
520         leftrule=3pt,rightrule=0pt,
521         left*=10pt,right=0pt,
522     },
523     fancythm@bclogo@left/.style={%
524         enhanced,breakable,boxrule=-1pt,boxsep=0pt,arc=2mm,toptitle=3mm,
525         right=1mm,pad at break=2mm,leftrule=1pt,top=3mm,drop fuzzy shadow
            ,
526         rightrule=1pt,toprule=1pt,left=7mm,bottomrule=1pt
527     },
528     fancythm@bclogo@right/.style={%
529         enhanced,breakable,boxrule=-1pt,boxsep=0pt,arc=2mm,toptitle=3mm,
530         left=1mm,pad at break=2mm,leftrule=1pt,top=3mm,drop fuzzy shadow
            southwest,
531         rightrule=1pt,toprule=1pt,right=7mm,bottomrule=1pt
532     }
533 }
534
535 \def\fancythm@thmbox@side{\fancythm@left@thmbox}

```

B.3. RTL switches

```

536 \def\fancythm@tcb@ribbon{\fancythm@tcbribbon@left}
537 \def\fancythm@bclogo@side{\fancythm@bclogo@left}
538
539 \AtBeginDocument{%
540     \@ifundefined{if@RTL}{}{%
541         \def\fancythm@colorcoded@RTL{%
542             \if@RTL
543                 \def\fancythm@colorcoded@dir{east}
544                 \def\fancythm@colorcoded@side{\fancythm@colorcoded@right}%
545             \else
546                 \def\fancythm@colorcoded@dir{west}
547                 \def\fancythm@colorcoded@side{\fancythm@colorcoded@left}%
548             \fi
549         }%
550         \def\fancythm@thmbox@RTL{%
551             \if@RTL

```

```

552         \def\fancythm@thmbox@side{fancythm@right@thmbox}%
553     \else
554         \def\fancythm@thmbox@side{fancythm@left@thmbox}%
555     \fi
556 }%
557 \def\fancythm@tcbribbon@RTL{%
558     \if@RTL
559         \def\fancythm@tcb@ribbon{fancythm@tcbribbon@right}%
560     \else
561         \def\fancythm@tcb@ribbon{fancythm@tcbribbon@left}%
562     \fi
563 }%
564 \def\fancythm@bclogo@RTL{%
565     \if@RTL
566         \def\fancythm@bclogo@side{fancythm@bclogo@right}%
567         \def\fancythm@bclogo@xshift{-4mm}%
568         \def\fancythm@bclogo@dir{east}%
569     \else
570         \def\fancythm@bclogo@side{fancythm@bclogo@left}%
571         \def\fancythm@bclogo@xshift{4mm}%
572         \def\fancythm@bclogo@dir{west}%
573     \fi
574 }%
575 }%
576 }
577
578 \def\fancythm@colorcoded@dir{west}
579 \def\fancythm@bclogo@xshift{4mm}
580 \def\fancythm@bclogo@dir{west}
581 \def\fancythm@colorcoded@RTL{}
582 \def\fancythm@thmbox@RTL{}
583 \def\fancythm@tcbribbon@RTL{}
584 \def\fancythm@bclogo@RTL{}
585
586 \def\define@fancythm@style#1{%

```

B.4. Style Keys

```

587 \define@fancythm@key{#1}{endstyle}
588 \define@key{fancythm@#1}{color}{%
589     \colorlet{fancythm@#1@color}{##1}%
590 }%
591 \define@key{fancythm@#1}{colorcoded}{[\relax]}{%
592     \setkeys{fancythm@#1}{%
593         default ,
594         beginstyle={%
595             \fancythm@colorcoded@RTL
596             \begin{tcolorbox}[
597                 \fancythm@colorcoded@side ,
598                 colback=white ,

```

```

599             borderline \fancythm@colorcoded@dir={3pt}{0pt}{
600                 fancythm@#1@color}
601         ],%
602         endstyle=\end{tcolorbox}
603     }%
604 }%
605 \define@key{fancythm@#1}{fancycolorcoded}{\relax}{%
606     \setkeys{fancythm@#1}{%
607         default ,
608         beginstyle={%
609             \fancythm@colorcoded@RTL
610             \begin{tcolorbox}[
611                 \fancythm@colorcoded@side ,
612                 borderline \fancythm@colorcoded@dir={3pt}{0pt}{
613                     fancythm@#1@color} ,
614                 colback=fancythm@#1@color!7 ,
615                 boxsep=3mm,
616                 bottom=-1mm,
617                 top=-1mm
618             ]%
619             },
620             endstyle=\end{tcolorbox} ,
621             }%
622             \@xa\g@addto@macro\csname fancythm@#1@headfont\endcsname{\color{
623                 fancythm@#1@color!70!black}}}%
624 }%
625 \define@key{fancythm@#1}{thmbox}[]{%
626     \setkeys{fancythm@#1}{%
627         default ,
628         headformat=\global\let\fancythm@note\NOTE,
629         headpunct=,
630         postheadspace=0em,
631         postheadhook={%
632             \fancythm@thmbox@RTL
633             \begin{tcolorbox}[
634                 \fancythm@thmbox@side##1,
635                 fonttitle=\normalfont\fancythm@lang@font\csname
636                     fancythm@#1@headfont\endcsname ,
637                 title=\csname #1title\endcsname\csname the#1
638                     \endcsname\fancythm@note\csname fancythm@#1
639                     @headpunct\endcsname ,
640                 fontupper=\normalfont\fancythm@lang@font\csname
641                     fancythm@#1@bodyfont\endcsname
642             ]%
643             },
644             prefoothook=\end{tcolorbox} ,
645             }%
646         }%
647     }%
648 \define@key{fancythm@#1}{tcb}{\relax}{%

```



```

642 \setkeys{fancythm@#1}{%
643     thmbox,
644     postheadhook={%
645         \begin{tcolorbox}[%
646             breakable,enhanced,
647             colback=fancythm@#1@color!5!white,
648             colframe=fancythm@#1@color!75!black,
649             fonttitle=\normalfont\fancythm@lang@font\csname
               fancythm@#1@headfont\endcsname,
650             title=\csname #1title\endcsname\csname the#1
               \endcsname\fancythm@note\csname fancythm@#1
               @headpunct\endcsname,
651             fontupper=\normalfont\fancythm@lang@font\csname
               fancythm@#1@bodyfont\endcsname
652         ]%
653     }
654 }%
655 }%
656 \define@key{fancythm@#1}{tcbribbon}{\relax}{%
657     \setkeys{fancythm@#1}{%
658         thmbox,
659         postheadhook={%
660             \fancythm@tcbribbon@RTL
661             \begin{tcolorbox}[
662                 \fancythm@tcb@ribbon,
663                 colbacktitle=fancythm@#1@color,
664                 fonttitle=\normalfont\fancythm@lang@font\csname
                       fancythm@#1@headfont\endcsname,
665                 title=\csname #1title\endcsname\csname the#1
                       \endcsname\fancythm@note\csname fancythm@#1
                       @headpunct\endcsname,
666                 fontupper=\normalfont\fancythm@lang@font\csname
                       fancythm@#1@bodyfont\endcsname,
667                 colback=fancythm@#1@color!10!white
668             ]%
669         }
670     }%
671 }%
672 \define@key{fancythm@#1}{tcbdiamond}{\relax}{%
673     \setkeys{fancythm@#1}{%
674         thmbox,
675         postheadhook={%
676             \begin{tcolorbox}[
677                 fancythm@tcb@diamond,
678                 colframe=fancythm@#1@color!50!black,
679                 colback=fancythm@#1@color!10!white,
680                 colbacktitle=fancythm@#1@color!5!yellow!10!white,
681                 coltitle=black,
682                 fonttitle=\normalfont\fancythm@lang@font\csname
                       fancythm@#1@headfont\endcsname,

```

```

683         title=\csname #1title\endcsname\csname the#1
           \endcsname\fancythm@note\csname fancythm@#1
           @headpunct\endcsname ,
684         fontupper=\normalfont\fancythm@lang@font\csname
           fancythm@#1@bodyfont\endcsname
685     ]%
686 }
687 }%
688 }%
689 \define@key{fancythm@#1}{bclogo}{\relax}{%
690     \setkeys{fancythm@#1}{%
691         thmbox,
692         postheadhook={%
693             \fancythm@bclogo@RTL
694             \begin{tcolorbox}[%
695                 \fancythm@bclogo@side ,
696                 colframe=fancythm@#1@color!50!white ,
697                 colback=fancythm@#1@color!10!white ,
698                 colbacktitle=fancythm@#1@color!10!white ,
699                 coltitle=black ,
700                 fonttitle=\normalfont\fancythm@lang@font\large\csname
                   fancythm@#1@headfont\endcsname ,
701                 title=\csname #1title\endcsname\csname the#1
                   \endcsname\fancythm@note\csname fancythm@#1
                   @headpunct\endcsname ,
702                 fontupper=\normalfont\fancythm@lang@font\csname
                   fancythm@#1@bodyfont\endcsname ,
703                 overlay unbroken and first={\node[inner sep=0pt] (
                   logo) at ([xshift=\fancythm@bclogo@xshift,yshift
                   =-5mm]frame.north \fancythm@bclogo@dir) {\csname
                   fancythm@#1@logo\endcsname}};
704                 \draw[black,line width=2pt,decorate=true,decoration=
                   snake] (logo) — ([xshift=\fancythm@bclogo@xshift,
                   yshift=1.5mm]frame.south \fancythm@bclogo@dir);} ,
705                 overlay middle and last={\draw[black,line width=2pt,
                   decorate=true,decoration=snake] ([xshift=
                   \fancythm@bclogo@xshift,yshift=-1.5mm]frame.north
                   \fancythm@bclogo@dir) — ([xshift=
                   \fancythm@bclogo@xshift,yshift=1.5mm]frame.south
                   \fancythm@bclogo@dir);} }
706     ]%
707 }
708 }%
709 }%
710 }
711 \endinput

```