The `rbt-mathnotes` Package

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1.0.2 2021/11/29

Abstract

Rebecca Turner's personal macros and styles for typesetting mathematics notes.

NOTE Browse the sources, contribute, or complain at
github.com/9999years/latex-mathnotes

Contents

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This work has the LPPL maintenance status 'maintained'.

The Current Maintainer of this work is Rebecca B. Turner.

This work consists of the files:

- `README.md`
- `rbt-mathnotes.tex`
- `rbt-mathnotes.sty`
- `rbt-mathnotes.cls`
- `rbt-mathnotes-util.sty`
- `rbt-mathnotes-messages.sty`
- `rbt-mathnotes-hw.cls`
- `rbt-mathnotes-formula-sheet.cls`
- `examples/cheat-sheet.tex`
- `examples/multivar.tex`
- `examples/topology-hw-1.tex`

and the derived files:

- `rbt-mathnotes.pdf`
- `examples/cheat-sheet.pdf`
- `examples/multivar.pdf`
- `examples/topology-hw-1.pdf`

1 Package options

Some options are enabled by default, and can be disabled by passing `no⟨option⟩`. The enabled-by-default options are:

fonts=⟨true|false⟩ true

stix=⟨true|false⟩ true

- In XeTeX or LuaTeX, loads the unicode-math package, and then, if the `stix` option is also given, loads the `STIX2Text` and `STIX2Math` OTF fonts (available in the stix2-otf package).

  The `STIX2Math` font is loaded with stylistic sets 1 (roundhand script forms instead of chancery script for `\mathcal` Script Alphanumeric Symbols) and 8 (upright, rather than slanted, forms for integrals); see "Stylistic Sets" in the stix2-otf documentation (pp. 51–53) for more information.
- In other engines, if the `stix` option is also given, loads the `stix2` package from stix2-type1.

symbols=⟨true|false⟩ true

Defines a collection of "natural language" math-mode symbol commands. Most commands are declared with `\ProvideDocumentCommand` so that they won't overwrite custom commands you've already defined.

Note that symbols may look different depending on the `fonts` and `stix` options.

`\lnot`	$\neg$
`\Rational`, `\Rat`, `\Q`	$\mathbb{Q}$
`\Natural`, `\Nat`, `\N`	$\mathbb{N}$
`\Integer`, `\Int`, `\Z`	$\mathbb{Z}$
`\Complex`, `\Comp`, `\C`	$\mathbb{C}$
`\Real`, `\R`	$\mathbb{R}$
`\powerset`	$\wp$
`\vec{A}`	$\mathbf{A}$
`\intersection`, `\inter`	$\cap$
`\bigintersection`, `\biginter`	$\bigcap$
`\union`	$\cup$
`\bigunion`	$\bigcup$
`\divisible`, `\div`	$a \mid b$
`\notdivisible`, `\ndivisible`, `\notdiv`, `\ndiv`	$a \nmid b$
`\floor{A}`	$\lfloor A \rfloor$
`\ceil{A}`	$\lceil A \rceil$
`\emptyset`, `\es`	$\varnothing$
`\after`	$g \circ f$
`\cross`	$a \times b$
`\img`	$\operatorname{img} f$
`\pre`	$\operatorname{pre} f$
`\Stab`	$\operatorname{Stab} f$
`\FixPt`	$\operatorname{FixPt} f$
`\id`	id
`\injection`, `\inj`	$\hookrightarrow$
`\surjection`, `\surj`	$\twoheadrightarrow$

\bijection, \bij	$\twoheadrightarrow$
\restriction, \restr	$f\restriction_{\mathbb{N}}$
\dd[y]{x}	$\frac{dy}{dx}$
\pd[y]{x}	$\frac{\partial y}{\partial x}$
\curl	curl
\dive	div

maketitle=⟨true|false⟩ true

Redefines \maketitle and related commands. The provided \maketitle command will automatically insert a \thanks if any email, course, instructor, institution, or semester is supplied with the \mathnotes command.

titles=⟨true|false⟩ true

No-op; may set the format of sectioning commands in the future.

xcolor=⟨true|false⟩ true

Load the xcolor package and defines several colors with the MN prefix.

theorems=⟨true|false⟩ true

Set up various theorem environments with the ntheorem and mdframed packages.

Provides thm (Theorem), lem (Lemma), cor (Corollary), prop (Proposition), defn (Definition), notation, ex (Example), note, remark, hint, and abuse-of-notation (Abuse of notation) theorem-like environments.

enumitem=⟨true|false⟩ true

Loads the enumitem package.

The other options are not enabled by default, and can be enabled by passing ⟨*option*⟩ — the option name — as a package option:

listings=⟨true|false⟩

Loads the listings and xcolor packages. Sets default styles for listings, including setting the default language to Mathematica.

knowledge

⟨true|false⟩] Loads the knowledge package and sets up default styles. Patches lists so that manually placing \AP and \itemAP commands is unecessary.

index=⟨true|false⟩

Sets the knowledge key and starts indexing with \makeindex.

footnotes=⟨true|false⟩

Loads the footmisc package and sets up footnotes.

figures=⟨true|false⟩

Loads the graphicx and caption packages and sets up figure captions.

tabu=⟨true|false⟩

Loads the multirow, booktabs, longtable, and tabu packages.

Defines the \Th command.

kindle=⟨true|false⟩

Sets a small page size and tweaks the layout for Kindle devices; designed in particular for whatever generation of Kindle Paperwhite I have. Only compatible with the memoir document class.

2 Commands

`\numberthis`

At the end of a line (before the \\) in an amsmath starred environment, gives an equation a number.

$$\begin{aligned} x &= y \\ y &= 2z \\ z &= 1/w \end{aligned} \tag{0}$$

```
\begin{alignat*}{2}
  x &= y \\
  y &= 2z \numberthis \\
  z &= 1/w
\end{alignat*}
```

`\labelthis{`⟨*label*⟩`}`

At the end of a line (before the \\) in an amsmath starred environment, gives an equation a number and label for referencing.

$$\begin{aligned} x &= y \\ y &= 2z \\ z &= 1/w. \end{aligned} \tag{0}$$

As we saw in Equation 0, ...

```
\begin{alignat*}{2}
  x &= y \\
  y &= 2z \labelthis{eq:cool} \\
  z &= 1/w.
\end{alignat*}
As we saw in
Equation~\ref{eq:cool}, \dots
```

`\newacronym[`⟨*command*⟩`]{`⟨*text*⟩`}`

Defines \⟨*command*⟩ to be `\textsc{`⟨*text*⟩`}`; ⟨*command*⟩ defaults to ⟨*text*⟩ if ommitted.

NIST is not associated with CTAN.

```
\newacronym{nist}
\newacronym[\seetan]{ctan}

\nist\ is not associated
with \seetan.
```

`\newacronyms{`⟨*acronyms*⟩`}`

Defines a collection of acronym commands together using `\newacronym`; ⟨*acronyms*⟩ is a comma-separated list of acronyms.

APA and MLA are common citation styles.

```
\newacronyms{apa, mla}

\apa\ and \mla\ are common
citation styles.
```

`\mathnotes{`⟨*key-value pairs*⟩`}`

`date`=⟨*date*⟩

`author`=⟨*author*⟩

`title`=⟨*title*⟩

Sets the date, author, or title; setting these keys are equivalent to using the `\date`, `\author`, and `\title` commands, respectively.

`institution`=⟨*institution*⟩

Sets the institution (e.g., Brandeis University) associated with the document.

`course`=⟨*course*⟩

Sets the course (e.g., MATH 23a) associated with the document.

`semester`=⟨*semester*⟩

Sets the semester (e.g., Fall 2018) associated with the document.

`instructor`=⟨*instructor*⟩

Sets the instructor (e.g., Prof. Ruth Charney) associated with the document.

`email`=⟨*email*⟩

Sets the email (e.g., rbt@sent.as) associated with the author.

`\TODO[`⟨*item*⟩`]`

Typesets a to-do marker.

TODO

TODO: explain in detail

```
\TODO

\TODO[explain in detail]
```

`\email{`⟨*email*⟩`}`

Typesets an email address, with a link if the `hyperref` package is loaded.

rbt@sent.as

```
\email{rbt@sent.as}
```

`\Th[`⟨*column spec*⟩`]{`⟨*header*⟩`}`

Typesets a table column header in bold using `\multicolumn`. Especially useful if the column in question is a math or numeric column.

⟨*column spec*⟩ defaults to `l` (left-aligned).

3 The `rbt-mathnotes` document class

The `rbt-mathnotes` document class is a `memoir`-based class that automatically loads the `rbt-mathnotes` package.

4 The `rbt-mathnotes-hw` document class

The `rbt-mathnotes-hw` document class is based on the `rbt-mathnotes` document class, providing additional commands and styles for typesetting homework assignments. Theorems are given subtler styling that takes up less space on the page. The author name and title are added to the top-left heading.

`problem`
`\begin{problem}[`⟨*number or options*⟩`]`
`\prob[`⟨*number or options*⟩`]{`⟨*text*⟩`}`

The `problem` environment (and its matching shorthand `\prob`) typesets a homework problem typesets a homework problem. Problems are added to the table of contents at the chapter-level, which is the top level if I remember correctly.

⟨*number or options*⟩ is a list of key-value pairs:

`number`=⟨*number*⟩

Sets the problem's number. For brevity, an unrecognized key with no value is also used as the problem number; this allows concise expressions like `\begin{problem}[4.3a] ...` to specify problem numbers (to match textbook problem numbers, for example). Otherwise, problem numbers start at 1 and count up.

`title`=⟨*title*⟩

Sets the problem's "title".

`label`=⟨*label*⟩

Sets the problem's label (e.g., `prob:n-sheeted-covering`), which can be referred to later with `\ref`.

If your professor calls them "exercises" or something, you can change the string used to refer to them with the `\mathnotes` command, which supports an additional key in `rbt-mathnotes-hw`:

`problem string`=⟨*problem string*⟩ `Problem`

The string used to represent a problem in titles and contents entries.

5 The `rbt-mathnotes-formula-sheet` document class

Sometimes, exams will let you take any formula sheet of a given size as reference material. The `rbt-mathnotes-formula-sheet` document class (based on the `article` class) is optimized for getting as much material as possible in that area. A tiny `\maketitle` is provided, as well as a tiny `\section`. Theorem titles are highly abbreviated ("Thm" instead of "Theorem"). Lists are rendered without linebreaks between items. Paragraphs are compressed and the page margins are set to a tenth of an inch. The entire document is set in `\scriptsize`.

Some additional keys are added to the `\mathnotes` command to customize the output:

`columns`=⟨*column count*⟩ 3

The number of text columns to set the formula sheet in; use 1 to turn off columns.

`balance columns`

If set, the unstarred `multicols` environment is used instead of `multicols*`, which attempts to spread material between each of the columns evenly, to make their vertical sizes as even as possible.

It doesn't look great — you want to know when you've filled up one column — so it's off by default.

`width`=⟨*width*⟩ `8.5in`

`height`=⟨*height*⟩ `11in`

Set the paper width and height. The 0.1 inch margins are not customizable.

6 Changelog

1.0.2 Rebecca Turner (2021-11-27) — Added license notice to all files.

1.0.1 Rebecca Turner (2021-11-24) — Renamed package from `mathnotes` to `rbt-mathnotes` to avoid a file name conflict with `CTAN:/fonts/newtx/doc/mathnotes.pdf`.

1.0.0 Rebecca Turner (2021-11-04) — Initial release as `mathnotes`, documented package.