

The **skmath** package^{*†}

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Version 0.1c

Abstract The skmathpackage provides improved and new math commands for superior typesetting with less effort.

1 Introduction

This package intends to provide helpful (re-)definitions of commands related to typesetting mathematics, and specifically typesetting them in a more intuitive, less verbose and more beautiful way. It was originally not intended for use by the public, and as such there may be incompatibilities with other packages of which I am not aware, but I figured it could be useful to other people as well.

2 Usage

2.1 Options

As of version v0.1c, there is only one option: `commonsets`. By default, it is disabled but if the option is given the package will define `\N`, `\Z`, `\Q`, `\R` and `\C` as blackboard variants of the respective letters, to represent the common sets of numbers.

^{*}Available on <http://www.ctan.org/pkg/skmath>.

[†]Development version available on <https://github.com/urdh/skmath>.

2.2 New commands

The package defines a number of new commands that aid in typesetting certain mathematical formulae.

`\N \Z \Q \R \C`

These commands are only available if the `commonsets` option is given. They typeset the set of natural, integer, rational, real and complex numbers respectively.

Example:

$\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}, \mathbb{C}.$

`\norm{<expression>}`
`\abs{<expression>}`

The commands `\norm` and `\abs`, quite expectedly, typeset the norm and absolute value of an expression, respectively. They have one mandatory argument (the expression), and different norms can be achieved by appending a subscript after the argument of `\norm`.

Example:

$$\|x\|_p = \left(\sum_{i=1}^n |x_i|^p \right)^{1/p}$$

`\d{<variable>}`

There is also a command `\d`, with one mandatory argument, that typesets the differential part of an integral.

Example:

$$\int_{\mathbb{R}} \frac{\sin(x)}{x} dx$$

2.3 Improved commands

In addition to adding new commands, this package also redefines already existing commands in a mostly backwards-compatible way to improve their usefulness.

<code>\sin[<i>power</i>]{<i>expression</i>}</code>	<code>\arcsin{<i>expression</i>}</code>
<code>\cos[<i>power</i>]{<i>expression</i>}</code>	<code>\arccos{<i>expression</i>}</code>
<code>\tan[<i>power</i>]{<i>expression</i>}</code>	<code>\arctan{<i>expression</i>}</code>
<code>\cot[<i>power</i>]{<i>expression</i>}</code>	

The trigonometric functions have been redefined to typeset more easily. They typeset *expression* as an argument of the expression, and (if applicable) *power* as a superscript between the function and its argument, e.g. $\sin^2(\phi)$.

<code>\ln{<i>expression</i>}</code>

The natural logarithm macro `\ln` has also been redefined to require an argument which is typeset as the argument of the logarithm.

<code>\log[<i>base</i>]{<i>expression</i>}</code>

The related macro `\log` is redefined in a similar way, but also accepts an optional argument denoting the base of the logarithm: $\log_2(x)$.

<code>\exp{<i>expression</i>}</code>

The exponential, `\exp`, is redefined to typeset its argument as a superscript of e in some display styles, and as an argument of `exp` otherwise:

$$e^{\sqrt{2}\exp(x)}$$

2.4 Stylistic changes

Some commands have been redefined in a completely backwards-compatible way to improve the end result of their typesetting.

$\frac{\langle numerator \rangle}{\langle denominator \rangle}$

The `\frac` command has been changed to improve typesetting, allowing displaystyle math in some settings.

$\overline{\langle expression \rangle}$ $\vec{\langle expression \rangle}$

The `\bar` command has been changed to cover the entire $\langle expression \rangle$ (i.e. \overline{uv}), and `\vec` has been changed to match the `\vectorsym` command provided by `isomath`.

3 Implementation

The package implementation is very simple. First, we do the standard $\text{\LaTeX 2}_{\epsilon}$ preamble thing, then we require some dependencies.

```
1 \NeedsTeXFormat{LaTeX2e}[1999/12/01]
2 \ProvidesPackage{skmath}%
3   [2012/12/14 v0.1b skmath improved math commands]
4 \RequirePackage{xparse}
5 \RequirePackage[intlimits]{amsmath}
6 \RequirePackage{kvoptions,amssymb,mathtools,xfrac,isomath}
```

We begin by declaring an option.

```
7 \SetupKeyvalOptions{family=skmath,prefix=skmath@}
8 \DeclareBoolOption[false]{commonsets}
9 \ProcessKeyvalOptions*
```

We optionally provide commands to typeset common sets.

```
10 \ifskmath@commonsets
```

\mathbb{N}

```
11 \NewDocumentCommand\N{}{\ensuremath{\mathbb{N}}}
```

$\backslash Z$

12 `\NewDocumentCommand\Z{}{\ensuremath{\mathbb{Z}}}`

$\backslash Q$

13 `\NewDocumentCommand\Q{}{\ensuremath{\mathbb{Q}}}`

$\backslash R$

14 `\NewDocumentCommand\R{}{\ensuremath{\mathbb{R}}}`

$\backslash C$

15 `\NewDocumentCommand\C{}{\ensuremath{\mathbb{C}}}`

16 `\fi`

This is followed by commands to typeset the norm and absolute value.

$\backslash abs$

17 `\DeclarePairedDelimiter\abs{\lvert}{\rvert}`

`\norm`

```
18 \DeclarePairedDelimiter\norm{\lVert}{\rVert}
```

We replace all trigonometric functions and some other common functions with alternatives that take an argument (or optionally, several arguments).

```
19 \let\skmath@sin\sin
20 \let\skmath@cos\cos
21 \let\skmath@tan\tan
22 \let\skmath@cot\cot
23 \let\skmath@arcsin\arcsin
24 \let\skmath@arccos\arccos
25 \let\skmath@arccos\arctan
26 \let\skmath@ln\log
27 \let\skmath@log\log
28 \let\skmath@exp\exp
```

`\sin`

```
29 \RenewDocumentCommand\sin{om}{%
30   \IfNoValueTF{#1}
31     {\ensuremath{\skmath@sin\left(#2\right)}}
32     {\ensuremath{\skmath@sin^{#1}\left(#2\right)}}}%
33 }
```

`\cos`

```
34 \RenewDocumentCommand\cos{om}{%
35   \IfNoValueTF{#1}
36     {\ensuremath{\skmath@cos\left(#2\right)}}
37     {\ensuremath{\skmath@cos^{#1}\left(#2\right)}}}%
38 }
```

`\tan`

```
39 \RenewDocumentCommand\tan{om}{%  
40   \IfNoValueTF{#1}  
41     {\ensuremath{\skmath@tan\left(#2\right)}}  
42     {\ensuremath{\skmath@tan^{#1}\left(#2\right)}}}%  
43 }
```

`\cot`

```
44 \RenewDocumentCommand\cot{om}{%  
45   \IfNoValueTF{#1}  
46     {\ensuremath{\skmath@cot\left(#2\right)}}  
47     {\ensuremath{\skmath@cot^{#1}\left(#2\right)}}}%  
48 }
```

`\arcsin`

```
49 \RenewDocumentCommand\arcsin{m}{%  
50   \ensuremath{\skmath@arcsin\left(#1\right)}}%  
51 }
```

`\arccos`

```
52 \RenewDocumentCommand\arccos{m}{%  
53   \ensuremath{\skmath@arccos\left(#1\right)}}%  
54 }
```

`\arctan`

```
55 \RenewDocumentCommand\arctan{m}{%  
56   \ensuremath{\skmath@arctan\left(#1\right)}}%  
57 }
```

`\ln`

```
58 \RenewDocumentCommand\ln{m}{%  
59   \ensuremath{\skmath@ln\left(#1\right)}}%  
60 }
```

`\log`

```
61 \RenewDocumentCommand\log{om}{%  
62   \IfNoValueTF{#1}  
63     {\ensuremath{\skmath@log\left(#2\right)}}%  
64     {\ensuremath{\skmath@log_{#1}\left(#2\right)}}%  
65 }
```

`\exp`

```
66 \RenewDocumentCommand\exp{m}{\ensuremath{\mathchoice%  
67   {e^{#1}}%  
68   {\skmath@exp\left(#1\right)}}%  
69   {\skmath@exp\left(#1\right)}}%  
70   {\skmath@exp\left(#1\right)}}%  
71 }}
```

The fraction command is modified to improve typesetting.

`\frac`

```
72 \RenewDocumentCommand\frac{mm}{\genfrac{}{}{}{}%  
73     {\displaystyle #1}{\displaystyle #2}}
```

The `\bar` command is also modified to improve typesetting.

`\bar`

```
74 \RenewDocumentCommand\bar{m}{-%  
75     \ensuremath{\mkern 1.5mu\overline{\mkern-1.5mu{#1}\mkern-1.5mu}\mkern 1.5mu}}
```

We introduce a command to typeset the differential part of integrals, shamefully stolen from an answer on T_EX.S.E. Definition is deferred until after all packages are loaded to avoid collisions with other `\d` commands.

```
76 \AtBeginDocument{%
```

`\d`

```
77 \DeclareDocumentCommand\d{m}{\ensuremath{\,\,\mathrm{d}}#1%  
78     \@ifnextchar\d{\!}{}}
```

```
79 }
```

Finally, we define a nicer way to denote vectors.

`\vec`

```
80 \let\vec\vectorsym
```

81 `\endinput`

4 Changes

v0.1

General: Initial version.

v0.1b

General: Load `amsmath` with `intlimits` option.

`\bar`: Added `\bar` replacement.

`\C`: Moved to `xparse` command definition.

`\d`: Moved to `xparse` command definition.

`\exp`: Moved to `xparse` command definition.

`\frac`: Moved to `xparse` command definition.

`\N`: Moved to `xparse` command definition.

`\Q`: Moved to `xparse` command definition.

`\R`: Moved to `xparse` command definition.

`\Z`: Moved to `xparse` command definition.

v0.1a

`\d`: Fixed obtuse errors.

v0.1c

General: Moved package from `docstrip` to `skdoc`.

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