

The `skmath` package*

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December 15, 2012

1 Introduction

This package provides improved and new math commands for superior typesetting with lower effort.

2 Usage

2.1 Options

As of version v0.1b, 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.

2.2 Commands

2.2.1 Common sets

`\N` As stated above, these commands (`\N`, `\Z`, `\Q`, `\R` and `\C`) are only available if the
`\Z` `commonsets` option is given. They typeset the set of natural, integer, rational, real
`\Q` and complex numbers respectively:

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

2.2.2 New commands

The following commands are introduced to help improve typesetting.

`\norm` The commands `\norm` and `\abs`, quite expectedly, typeset the norm and abso-
`\abs` lute value of an expression, respectively. They have one mandatory argument (the

*This document corresponds to `skmath` v0.1b, dated 2012/12/14.

expression), and different norms can be achieved by appending a subscript after the argument of `\norm`:

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

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

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

2.3 Improved commands

2.3.1 Trigonometric functions

`\sin` Some common trigonometric functions — `\sin`, `\cos`, `\tan`, `\cot`, `\arcsin`,
`\cos` `\arccos` and `\arctan` — have been redefined to typeset more easily. They now
`\tan` take one optional (does not apply to the `\arc*` macros) and one mandatory ar-
`\cot` gument; the mandatory argument is the argument to the trigonometric function
`\arcsin` and the optional argument is typeset in superscript between the function and its
`\arccos` argument, e.g. $\sin^2(\phi)$.
`\arctan`

2.3.2 Logarithmic and exponential functions

`\ln` The natural logarithm macro `\ln` has also been redefined to require an argument
`\log` which is typeset as the argument of the logarithm. The related macro `\log` is
redefined in a similar way, but also accepts an optional argument denoting the
base of the logarithm: $\log_2(x)$.

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:

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

2.3.3 Stylistic changes

`\frac` The `\frac` command has been changed to improve typesetting, and the `\bar`
`\bar` command has been changed to cover the entire expression (*i.e.* \overline{uv}). Additionally,
`\vec` the `\vec` command is defined as a copy of the `\vectorsym` command of the `isomath`
package, as such: \boldsymbol{x} .

3 Implementation

The package implementation is very simple. First, we require some dependencies.

```
1 \RequirePackage{xparse}
2 \RequirePackage[intlimits]{amsmath}
3 \RequirePackage{kvoptions,amssymb,mathtools,xfrac,isomath}
```

We begin by declaring an option.

```
4 \SetupKeyvalOptions{family=skmath,prefix=skmath@}
5 \DeclareBoolOption[false]{commonsets}
6 \ProcessKeyvalOptions*
```

We optionally provide commands to typeset common sets

```
7 \ifskmath@commonsets
```

`\N`

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

`\Z`

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

`\Q`

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

`\R`

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

`\C`

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

```
13 \fi
```

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

`\abs`

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

`\norm`

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

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

```
16 \let\skmath@sin\sin
17 \let\skmath@cos\cos
18 \let\skmath@tan\tan
19 \let\skmath@cot\cot
20 \let\skmath@arcsin\arcsin
21 \let\skmath@arccos\arccos
22 \let\skmath@arccos\arctan
23 \let\skmath@ln\log
24 \let\skmath@log\log
25 \let\skmath@exp\exp
```

`\sin`

```
26 \RenewDocumentCommand\sin{om}{%
27 \IfNoValueTF{#1}
28 {\ensuremath{\skmath@sin\left(#2\right)}}
29 {\ensuremath{\skmath@sin^{#1}\left(#2\right)}}}%
30 }
```

```

\cos
31 \RenewDocumentCommand\cos{om}{%
32 \IfNoValueTF{#1}
33   {\ensuremath{\skmath@cos\left(#2\right)}}
34   {\ensuremath{\skmath@cos^{#1}\left(#2\right)}}}%
35 }

\tan
36 \RenewDocumentCommand\tan{om}{%
37 \IfNoValueTF{#1}
38   {\ensuremath{\skmath@tan\left(#2\right)}}
39   {\ensuremath{\skmath@tan^{#1}\left(#2\right)}}}%
40 }

\cot
41 \RenewDocumentCommand\cot{om}{%
42 \IfNoValueTF{#1}
43   {\ensuremath{\skmath@cot\left(#2\right)}}
44   {\ensuremath{\skmath@cot^{#1}\left(#2\right)}}}%
45 }

\arcsin
46 \RenewDocumentCommand\arcsin{m}{%
47 \ensuremath{\skmath@arcsin\left(#1\right)}}%
48 }

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

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

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

\log
58 \RenewDocumentCommand\log{om}{%
59 \IfNoValueTF{#1}
60   {\ensuremath{\skmath@log\left(#2\right)}}
61   {\ensuremath{\skmath@log_{#1}\left(#2\right)}}}%
62 }

```

`\exp`

```
63 \RenewDocumentCommand\exp{m}{\ensuremath{\mathchoice%
64   {e^{#1}}}%
65   {\skmath@exp\left(#1\right)}}%
66   {\skmath@exp\left(#1\right)}}%
67   {\skmath@exp\left(#1\right)}}%
68 }}
```

The fraction command is modified to improve typesetting.

`\frac`

```
69 \RenewDocumentCommand\frac{mm}{\genfrac{}{}{}{}%
70   {\displaystyle #1}{\displaystyle #2}}
```

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

`\bar`

```
71 \RenewDocumentCommand\bar{m}{%
72   \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 [TeX.SE](#). Definition is deferred until after all packages are loaded to avoid collisions with other `\d` commands.

```
73 \AtBeginDocument{%
```

`\d`

```
74 \DeclareDocumentCommand\d{m}{\ensuremath{\,\mathrm{d}}#1%
75   \@ifnextchar\d{\!}{}}
76 }
```

Finally, we define a nicer way to denote vectors.

`\vec`

```
77 \let\vec\vectorsym
```