Package 'latexSymb'

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Type Package

Title R Functions for Readable LaTeX Mathematical Expressions

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Author Nicolas Escobar [aut, cre]

Maintainer Nicolas Escobar <nescoba@iu.edu>

Description Build complex 'LaTeX' mathematical expressions using intuitive 'R' functions. Replace error-prone 'LaTeX' syntax with readable, modular functions that make mathematical typesetting straightforward and maintainable.

License GPL (>= 3)

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Contents

`+` *Arithmetic*

Description

There are natural interpretations for doing arithmetic operations on objects of class `latexSymb`. Namely, their output is another object of that class, constructed using the `repr` of the arguments and the corresponding symbol for the operation. These functions implement the elementary ones.

Usage

```
a + b
a - b
a / b
a * b
a ^ b
under(a,b)
```

Arguments

`a`	An object that can be passed to `as.character`
`b`	An object that can be passed to `as.character`

Value

An object of class `latex_symb` whose `repr` is:

- For `+` and `-`, the concatenation of `a`'s `repr`, the corresponding arithmetic symbol, and `b`'s `repr`.
- For `*`, the concatenation of the `repr`, with a space between.
- For `/`, `a` and `b`'s `repr` inside `\frac{}{}`.
- For `^`, `a`'s `repr`, a caret and `b`'s `repr` in braces.
- For `under`, `a`'s `repr`, an underscore and `b`'s `repr` in braces

Examples

```
a <- lsymb("\\alpha")
b <- lsymb("\\beta")
a+b
a-b
a*b
a/b
a^b
under(a,b)
```

at *Utilities for Mathematical Functions*

Description

These functions are used to create operations on functions in LaTeX. They represent evaluation, pullback, pushforward, derivatives and limits of functions.

Usage

```
at(f, var)
pback(f)
pfow(f)
dd(f, var)
pp(f, var)
lim(f, var, to = lsymb("\\infty"))
```

Arguments

f	latex_symb object representing a function
var	latex_symb object representing a variable
to	latex_symb object representing the limit of the function

Value

An object of class latex_symb whose repr is the LaTeX code for the operation applied to the function and the variable.

Examples

```
f <- lsymb("f")
x <- lsymb("x")
at(f, x)
pback(f)
pfow(f)
dd(f, x)
pp(f, x)
lim(f, x)
```

common *Common latex_symb objects*

Description

A collection of common latex_symb objects.

Format

An RData file containing:

i latex_symb object whose repr is "i"

j latex_symb object whose repr is "j"

k latex_symb object whose repr is "k"

l latex_symb object whose repr is "l"

m latex_symb object whose repr is "m"

n latex_symb object whose repr is "n"

x latex_symb object whose repr is "x"

y latex_symb object whose repr is "y"

z latex_symb object whose repr is "z"

f latex_symb object whose repr is "f"

g latex_symb object whose repr is "g"

h latex_symb object whose repr is "h"

al latex_symb object whose repr is "\\alpha"

be latex_symb object whose repr is "\\beta"

ga latex_symb object whose repr is "\\gamma"

de latex_symb object whose repr is "\\delta"

ep latex_symb object whose repr is "\\epsilon"

ze latex_symb object whose repr is "\\zeta"

et latex_symb object whose repr is "\\eta"

th latex_symb object whose repr is "\\theta"

io latex_symb object whose repr is "\\iota"

ka latex_symb object whose repr is "\\kappa"

la latex_symb object whose repr is "\\lambda"

mu latex_symb object whose repr is "\\mu"

nu latex_symb object whose repr is "\\nu"

xi latex_symb object whose repr is "\\xi"

om latex_symb object whose repr is "\\omicron"

pi.l latex_symb object whose repr is "\\pi"

rh latex_symb object whose repr is "\\rho"

si latex_symb object whose repr is "\\sigma"

ta latex_symb object whose repr is "\\tau"

up latex_symb object whose repr is "\\upsilon"

ph latex_symb object whose repr is "\\phi"

ch latex_symb object whose repr is "\\chi"

ps latex_symb object whose repr is "\\psi"

om latex_symb object whose repr is "\\omega"

des latex_symb object whose repr is ":"

eq latex_symb object whose repr is "="

neq latex_symb object whose repr is "\\neq"

lt latex_symb object whose repr is "<"

gt latex_symb object whose repr is ">"

leq latex_symb object whose repr is "\\leq"

geq latex_symb object whose repr is "\\geq"

bgs latex_symb object whose repr is "\\in"

mapsto latex_symb object whose repr is "\\mapsto"

to latex_symb object whose repr is "\\rightarrow"

ldots latex_symb object whose repr is "\\ldots"

Reals latex_symb object whose repr is "\\mathbb{R}"

Nats latex_symb object whose repr is "\\mathbb{N}"

Ints latex_symb object whose repr is "\\mathbb{Z}"

Rats latex_symb object whose repr is "\\mathbb{Q}"

Comps latex_symb object whose repr is "\\mathbb{C}"

indic latex_symb object whose repr is "\\mathbb{1}"

infty latex_symb object whose repr is "\\infty"

comma latex_symb object whose repr is ","

endl latex_symb object whose repr is "\\\\"

thus latex_symb object whose repr is "\\Rightarrow"

minus latex_symb object whose repr is "-"

plus latex_symb object whose repr is "+"

times latex_symb object whose repr is "\\times"

quad latex_symb object whose repr is "\\quad"

ruler latex_symb object whose repr is "&"

il LaTeX *Environments*

Description

Equations and symbols in LaTeX can be either inline or on their own. il wraps expressions for the former, lenv for the latter.

Usage

```
il(x)
lenv(name, rows)
```

Arguments

x	An object of class latex_symb
name	The name of the LaTeX environment. For instance, align or gather
.	
rows	A list of objects that can be passed to as.character.

Value

- For il, x's repr surrounded by dollar signs.
- For lenv, a multiline string whose lines are: 1. A \begin statement for name; 2. The character representation of each row; 3. An \end statement for name

Examples

```
al <- lsymb("\\alpha")
be <- lsymb("\\beta")
il(al)
lenv("align",
    c(
      lsymb(al^2 - be^2, "&=", 0, "\\\\"),
      lsymb(pths(al - be)*pths(al + be), "&=", 0)
     )
)
```

lsymb *Create, print and turn to string objects of class* latex_symb

Description

The class latex_symb is simply a wrapper for a string with LaTeX code. lsymb creates the wrapper, as.character and print extract the string.

Usage

```
lsymb(...)
## S3 method for class 'latex_symb'
print(x, ...)
## S3 method for class 'latex_symb'
as.character(x, ...)
```

Arguments

...	Objects that can be passed to as.character.
x	An object of class latex_symb

Value

- lsymb returns an object of class latex_symb. It is an S3 class, whose objects are lists with a single component called repr. repr is the LaTeX code for the object, which is obtained by pasting the character representations of all the arguments.
- print.lsymb passes the repr of its first argument, plus additional arguments, to print. The returned value is whatever print returns.
- as.character.lsymb passes the repr of its first argument, plus additional arguments, to as.character. The returned value is whatever as.character returns.

Examples

```
al <- lsymb("\\alpha")
print(al)
as.character(al)
```

pths LaTeX *Enclosings*

Description

It is cumbersome to have to write `left` and `right` every time a grouping is used in LaTeX. These functions take care of that.

Usage

```
pths(x)
br(x)
sqbr(x)
ang(x)
```

Arguments

x	An object that can be passed to `as.character`.

Value

An object of class `latex_symb` whose `repr` is `x`'s `repr` enclosed by the corresponding symbols.

Examples

```
al <- lsymb("\\alpha")
pths(al)
br(al)
sqbr(al)
ang(al)
```

Sum *Cumulative Operators*

Description

These functions are used to create cumulative operators in LaTeX. They take care of the `sum`, `prod` and `int` functions.

Usage

```
Sum(f, from = lsymb(""), to = lsymb(""))
Prod(f, from = lsymb(""), to = lsymb(""))
Int(f, meas = lsymb("dx"), from = lsymb(""), to = lsymb(""))
```

Arguments

f	An expression to be summed, multiplied or integrated.
from	The lower limit of the sum, product or integral.
to	The upper limit of the sum, product or integral.
meas	The measure of the integral.

Value

An object of class latex_symb whose repr is the LaTeX code for the cumulative operator concatenated with the limits and the expression.

Examples

```
i <- lsymb("i")
n <- lsymb("n")
x <- lsymb("x")
f <- function(x) lsymb("f") * pths(x)
Sum(i, from = 1, to = n)
Prod(i, from = 1, to = n)
Int(f(x), from = 0, to = 1)
```

Index