Package 'term'

February 6, 2021				
Title Create, Manipulate and Query Parameter Terms				
Version 0.3.1				
Description Creates, manipulates, queries and repairs vectors of parameter terms. Parameter terms are the labels used to reference values in vectors, matrices and arrays. They represent the names in coefficient tables and the column names in 'mcmc' and 'mcmc.list' objects.				
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<pre>URL https://poissonconsulting.github.io/term/,</pre>				
https://github.com/poissonconsulting/term				
BugReports https://github.com/poissonconsulting/term/issues				
Depends R (>= 3.4)				
Imports chk, extras, lifecycle, purrr, rlang, universals, vctrs				
Suggests covr, testthat				
RdMacros lifecycle				
Encoding UTF-8				
Language en-US				
LazyData true				
Roxygen list(markdown = TRUE)				
RoxygenNote 7.1.1				
R topics documented:				
as_term as_term_rcrd chk_term complete_terms				

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as_term

Coerce to a Term Vector

Description

Coerces an R object to a term-vector().

Usage

```
as_term(x, ...)
as.term(x, ...)
## S3 method for class 'character'
as_term(x, repair = FALSE, normalize = repair, ...)
```

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```
## S3 method for class 'numeric'
as_term(x, name = "par", ...)
```

Arguments

x The object.
... Unused.

repair A flag specifying whether to repair terms.

normalize A flag specifying whether to normalize terms.

name A string specifying the name of the parameter.

Details

as.term has been **Soft-deprecated** for as_term.

Methods (by class)

- character: Coerce character vector to term vector
- numeric: Coerce numeric object to term vector

See Also

```
term-vector() and repair_terms()
```

Examples

```
as_term(matrix(1:4, 2))
as_term(c("parm3[10]", "parm3[2]", "parm[2,2]", "parm[1,1]"))
```

as_term_rcrd

Coerce to a Term Record

Description

Coerces an R object to a term_rcrd.

Usage

```
as_term_rcrd(x, ...)
## S3 method for class 'character'
as_term_rcrd(x, repair = FALSE, ...)
## S3 method for class 'numeric'
as_term_rcrd(x, name = "par", ...)
## S3 method for class 'term'
as_term_rcrd(x, repair = FALSE, ...)
```

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Arguments

x The object.
... Unused.

repair A flag specifying whether to repair terms.

A string specifying the name of the parameter.

Methods (by class)

 \bullet character: Coerce character vector to term_rcrd

• numeric: Coerce numeric vector to term_rcrd

• term: Coerce term vector to term_rcrd

See Also

```
repair_terms()
```

Examples

```
as_term(matrix(1:4, 2))
as_term(c("parm3[10]", "parm3[2]", "parm[2,2]", "parm[1,1]"))
```

chk_term

Check Term or Term Record

Description

Checks if term using vld_term() or vld_term_rcrd().

Usage

```
chk_term(x, validate = "complete", x_name = NULL)
chk_term_rcrd(x, validate = "complete", x_name = NULL)
```

Arguments

x The object.

validate A string specifying the level of the validation. The possible values in order of

increasing strictness are 'class', 'valid', 'consistent' and 'complete'.

x_name A string of the name of object x or NULL.

Value

NULL, invisibly. Called for the side effect of throwing an error if the condition is not met.

Functions

• chk_term_rcrd: Check Term Record

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Examples

```
# chk_term
x <- term("x[2]", "x[1]")
chk_term(x)
x <- c("x[2]", "x[1]")
try(chk_term(x, validate = "sorted"))

# chk_term_rcrd
x <- term_rcrd("x[2]", "x[1]")
chk_term_rcrd(x)
x <- c("x[2]", "x[1]")
try(chk_term_rcrd(x, validate = "sorted"))</pre>
```

complete_terms

Complete Terms

Description

Completes an object's terms.

Usage

```
complete_terms(x, ...)
## S3 method for class 'term'
complete_terms(x, ...)
## S3 method for class 'term_rcrd'
complete_terms(x, ...)
```

Arguments

```
x The object. . . . Unused.
```

Details

It must not have any invalid or missing (NA) values.

Methods (by class)

- term: Complete Terms for a term Vector
- term_rcrd: Complete Terms for a term_rcrd vector

See Also

```
term-vector(), repair_terms() and is_incomplete_terms().
```

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Examples

```
complete_terms(term("b[3]", "b[1]", "b[2]"))
complete_terms(term("z[2,2]", "z[1,1]"))
## Not run:
complete_terms(term_rcrd("b[3]", "b[1]", "b[2]"))
complete_terms(term_rcrd("z[2,2]", "z[1,1]"))
## End(Not run)
```

consistent_term

Consistent Terms

Description

Test whether the number of dimensions of terms in the same parameter are consistent.

Usage

```
consistent_term(x)
```

Arguments

Х

The object.

Value

A logical vector indicating whether the number of dimensions is consistent.

See Also

```
term-vector() and npdims()
```

Examples

```
consistent\_term(term("alpha[1]", "alpha[3]", "beta[1,1]", "beta[2,1]")) \\ consistent\_term(term("alpha[1]", NA\_term\_, "beta[1,1]", "beta[2]")) \\
```

dims.term

Dimensions

Description

Gets the dimensions of an object.

Usage

```
## S3 method for class 'term' dims(x, ...)
```

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Arguments

x An object.

. . . Other arguments passed to methods.

Details

Unlike base::dim(), dims returns the length of an atomic vector.

Value

An integer vector of the dimensions.

See Also

```
base::dim()
Other dimensions: ndims(), npdims(), pdims()
```

Examples

```
dims(term("beta[1,1]"))
dims(term("beta[1,1]", "beta[1,2]"))
```

dims.term_rcrd

Dimensions

Description

Gets the dimensions of an object.

Usage

```
## S3 method for class 'term_rcrd'
dims(x, ...)
```

Arguments

x An object.

... Other arguments passed to methods.

Details

Unlike base::dim(), dims returns the length of an atomic vector.

Value

An integer vector of the dimensions.

See Also

```
base::dim()
Other dimensions: ndims(), npdims(), pdims()
```

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Examples

```
dims(term_rcrd("beta[1,1]"))
dims(term_rcrd("beta[1,1]", "beta[1,2]"))
```

Description

Tests whether a term vector has absent elements. The vector should not require repairing.

Usage

```
is_incomplete_terms(x, ...)
```

Arguments

```
x The object. ... Unused.
```

Value

A logical scalar indicating whether the object's terms are incomplete.

See Also

```
term-vector() and complete_terms()
```

Examples

```
is_incomplete_terms(term("b[2]"))
is_incomplete_terms(term("b[2]", "b[1]"))
is_incomplete_terms(term("b[2]", "b[1]", "b[1]"))
```

```
is_inconsistent_terms Is Inconsistent Terms
```

Description

Tests whether a term vector has inconsistent elements. Returns TRUE if includes missing or invalid terms.

Usage

```
is_inconsistent_terms(x, ...)
```

Arguments

```
x The object. ... Unused.
```

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Value

A logical scalar indicating whether the object's terms are inconsistent.

See Also

```
term-vector() and consistent_term()
```

Examples

```
is_inconsistent_terms(term("b[2]"))
is_inconsistent_terms(term("b[2]", "b[1]"))
is_inconsistent_terms(term("b[2]", "b[1,1]"))
```

is_term

Is Term

Description

Tests whether an R object inherits from S3 class term.

Usage

```
is_term(x)
```

Arguments

Χ

The object.

Details

It does not test the validity of consistency of the term elements.

Value

A flag indicating whether the test was positive.

See Also

```
term-vector(), vld_term(), valid_term() and consistent_term()
```

```
is_term(c("parameter[2]", "parameter[10]"))
is_term(term("parameter[2]", "parameter[10]"))
```

NA_term_

is_term_rcrd

Is Term Record

Description

Tests whether an R object inherits from S3 class term_rcrd.

Usage

```
is_term_rcrd(x)
```

Arguments

Χ

The object.

Details

It does not test the validity of consistency of the term elements.

Value

A flag indicating whether the test was positive.

See Also

```
valid_term() and consistent_term()
```

Examples

```
is_term_rcrd(new_term_rcrd())
```

NA_term_

Missing Term

Description

A missing term element.

Usage

NA_term_

Format

An object of class term (inherits from vctrs_vctr) of length 1.

See Also

```
term-vector()
```

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Examples

```
is_term(NA_term_)
is.na(NA_term_)
```

NA_term_rcrd_

Missing Term

Description

A missing term element of term_rcrd type.

Usage

```
NA_term_rcrd_
```

Format

An object of class term_rcrd (inherits from vctrs_rcrd, vctrs_vctr) of length 1.

See Also

```
term-vector()
```

Examples

```
is_term_rcrd(NA_term_)
is.na(NA_term_)
```

new_term

Construct a new term object

Description

Use this function to quickly construct a term object from a character vector, without checking the input. Use term() to repair the input.

Usage

```
new\_term(x = character())
```

Arguments

Х

A character vector.

```
new_term()
new_term(c("a", "b[1]", "b[2]"))

# Terms are not checked for validity:
new_term("r[")
repair_terms(new_term("r["))
```

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new_term_rcrd

Construct a new term_rcrd object

Description

Use this function to quickly construct a term_rcrd object.

Usage

```
new_term_rcrd(
   x = data.frame(par = character(), dim = I(list()), stringsAsFactors = FALSE)
)
```

Arguments

Х

A data frame with columns par and dim.

Examples

```
new_term_rcrd()
## Not run:
new_term_rcrd(data.frame(
  par = c("x", "x", "y"), dim = I(list(1, 2, c(2,2))),
  stringsAsFactors = FALSE
))
## End(Not run)
```

normalize_terms

Normalize Terms

Description

Normalizes a term vector.

Usage

```
normalize_terms(x)
```

Arguments

Х

The object.

Details

If a parameter such as b is a scalar then b[1] is replaced by b but if higher indices are included such as b[2] then b is replaced by b[1].

Value

The normalized term vector.

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See Also

```
term-vector() and repair_terms()
```

Examples

```
normalize_terms(new_term(c("b", "b[3]")))
normalize_terms(new_term(c("b[1]", "a[3]")))
```

npars.term

Number of Parameters

Description

Gets the number of parameters of an object.

The default methods returns the length of pars() if none are NA, otherwise it returns NA.

Usage

```
## S3 method for class 'term'
npars(x, scalar = NULL, ...)
```

Arguments

x An object.

scalar A flag specifying whether to by default return all parameters (NULL), or only

scalar parameters (TRUE) or only non-scalar parameters (FALSE).

... Other arguments passed to methods.

Value

An integer scalar of the number of parameters.

See Also

```
pars()
```

```
Other MCMC dimensions: nchains(), niters(), nsams(), nsims(), nterms()
Other parameters: pars(), set_pars()
```

```
npars(term("sigma", "alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]"))
```

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npdims.term

Number of Dimensions of each Parameter

Description

The terms argument is **Defunct**

Usage

```
## S3 method for class 'term'
npdims(x, terms = FALSE, ...)
```

Arguments

x An object.

terms A flag specifying whether to get the number of dimensions for each term ele-

ment.

... Other arguments passed to methods.

Value

A named integer vector of the number of dimensions of each parameter.

See Also

```
Other dimensions: dims(), ndims(), pdims()
```

Examples

```
npdims(term("alpha[1]", "alpha[3]", "beta[1,1]", "beta[2,1]"))
```

nterms.default

Number of Terms

Description

Gets the number of terms of an object.

Usage

```
## Default S3 method:
nterms(x, ...)
```

Arguments

x An object.

... Other arguments passed to methods.

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Value

A integer scalar of the number of terms.

See Also

```
Other MCMC dimensions: nchains(), niters(), npars(), nsams(), nsims()
```

Examples

```
nterms(term("alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]"))
nterms(term("alpha[1]", "alpha[1]", "beta[1,1]", "beta[1,1]"))
```

nterms.term

Number of Terms of a term

Description

Gets the number of terms of an MCMC object.

Usage

```
## S3 method for class 'term'
nterms(x, ...)
```

Arguments

x An object.

... Other arguments passed to methods.

Value

A integer scalar of the number of terms.

See Also

```
Other MCMC dimensions: nchains(), niters(), npars(), nsams(), nsims()
```

```
nterms(term("alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]"))
nterms(term("alpha[1]", "alpha[1]", "beta[1,1]", "beta[1,1]"))
```

pars.character

nterms.term_rcrd

Number of Terms of a term_rcrd

Description

Gets the number of terms of an MCMC object.

Usage

```
## S3 method for class 'term_rcrd'
nterms(x, ...)
```

Arguments

x An object.

... Other arguments passed to methods.

Value

A integer scalar of the number of terms.

See Also

```
Other MCMC dimensions: nchains(), niters(), npars(), nsams(), nsims()
```

Examples

```
nterms(as\_term\_rcrd(term("alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]"))) \\ nterms(as\_term\_rcrd(term("alpha[1]", "alpha[1]", "beta[1,1]", "beta[1,1]")))
```

pars.character

Parameter Names

Description

Gets the parameter names.

Usage

```
## S3 method for class 'character'
pars(x, scalar = NULL, ...)
```

Arguments

x An object.

scalar A flag specifying whether to by default return all parameters (NULL), or only

scalar parameters (TRUE) or only non-scalar parameters (FALSE).

... Other arguments passed to methods.

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Value

A character vector of the names of the parameters.

See Also

```
Other parameters: npars(), set_pars()
```

Examples

```
pars(c("a", "b[1]", "a[3]"))
```

pars.default

Parameter Names

Description

Gets the parameter names.

Usage

```
## Default S3 method:
pars(x, scalar = NULL, ...)
```

Arguments

x An object.

scalar A flag specifying whether to by default return all parameters (NULL), or only

scalar parameters (TRUE) or only non-scalar parameters (FALSE).

... Other arguments passed to methods.

Value

A character vector of the names of the parameters.

See Also

```
Other parameters: npars(), set_pars()
```

```
pars(matrix(1:4, nrow = 2))
```

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pars.term

Parameter Names

Description

Gets the parameter names.

Usage

```
## S3 method for class 'term'
pars(x, scalar = NULL, terms = FALSE, ...)
```

Arguments

x An object.

scalar A flag specifying whether to by default return all parameters (NULL), or only scalar parameters (TRUE) or only non-scalar parameters (FALSE).

terms A flag specifying whether to return the parameter name for each term element.

... Other arguments passed to methods.

Value

A character vector of the names of the parameters.

See Also

```
Other parameters: pars.term_rcrd(), pars_terms()
```

Examples

```
term <- term(
   "alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]",
   "beta[1,2]", "beta[2,2]", "sigma", NA
)
pars(term)
pars(term, scalar = TRUE)
pars(term, scalar = FALSE)</pre>
```

pars.term_rcrd

Parameter Names

Description

Gets the parameter names.

Usage

```
## S3 method for class 'term_rcrd'
pars(x, scalar = NULL, ...)
```

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Arguments

x An object.

scalar A flag specifying whether to by default return all parameters (NULL), or only

scalar parameters (TRUE) or only non-scalar parameters (FALSE).

... Other arguments passed to methods.

Value

A character vector of the names of the parameters.

See Also

```
Other parameters: pars.term(), pars_terms()
```

Examples

```
term <- term(
   "alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]",
   "beta[1,2]", "beta[2,2]", "sigma", NA
)
pars(term)
pars(term, scalar = TRUE)
pars(term, scalar = FALSE)</pre>
```

pars_terms

Term Parameters

Description

Gets the name of each parameter for each term.

Usage

```
pars_terms(x, scalar = NULL, ...)
```

Arguments

x A term vector.

scalar A flag specifying whether to by default return all parameters (NULL), or only

scalar parameters (TRUE) or only non-scalar parameters (FALSE).

... Unused.

Details

The scalar argument is **Defunct**

Value

A character vector of the term parameter names.

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See Also

```
Other parameters: pars.term_rcrd(), pars.term()
```

Examples

```
term <- term(
  "alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]",
  "beta[1,2]", "beta[2,2]", "sigma", NA
)
pars_terms(term)</pre>
```

pdims.term

Parameter Dimensions

Description

Gets the dimensions of each parameter of an object.

Usage

```
## S3 method for class 'term'
pdims(x, ...)
```

Arguments

x An object.

. . . Other arguments passed to methods.

Details

Errors if the parameter dimensions are invalid or inconsistent.

A named list of the dimensions of each parameter can be converted into the equivalent term-vector() using term().

Value

A named list of integer vectors of the dimensions of each parameter.

See Also

```
Other dimensions: dims(), ndims(), npdims()
```

```
pdims(term("alpha[1]", "alpha[3]", "beta[1,1]", "beta[2,1]"))
```

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pdims.term_rcrd

Parameter Dimensions

Description

Gets the dimensions of each parameter of an object.

Usage

```
## S3 method for class 'term_rcrd'
pdims(x, ...)
```

Arguments

x An object.

. . . Other arguments passed to methods.

Details

Errors if the parameter dimensions are inconsistent.

Value

A named list of integer vectors of the dimensions of each parameter.

See Also

```
Other dimensions: dims(), ndims(), npdims()
```

Examples

```
pdims(as_term_rcrd(term("alpha[1]", "alpha[3]", "beta[1,1]", "beta[2,1]")))
```

repair_terms

Repair Terms

Description

Repairs a terms vector.

Usage

```
repair_terms(x, normalize = TRUE)
```

Arguments

x The object.

normalize A flag specifying whether to normalize terms.

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Details

Invalid elements are replaced by missing values and spaces removed.

Value

The repaired term vector.

See Also

```
term-vector(), valid_term() and normalize_terms()
```

Examples

```
repair_terms(new_term(c("b[3]", "b")))
repair_terms(new_term(c("a[3]", "b[1]")))
repair_terms(new_term(c("a [3]", " b [ 1 ] ")))
repair_terms(new_term(c("a", NA)))
```

scalar_term

Scalar Term

Description

Test whether each term is a scalar.

Usage

```
scalar_term(x)
```

Arguments

Χ

The object.

Value

A logical vector indicating whether the term is a scalar.

```
scalar_term(term("alpha[1]", "alpha[3]", "beta[1]", "sigma[3]"))
scalar_term(term("alpha[1]", NA_term_, "beta[1]", "beta[3]"))
```

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set_pars.term

Set Parameter Names

Description

Sets an object's parameter names.

The assignment version pars<-() forwards to set_pars().

Usage

```
## S3 method for class 'term'
set_pars(x, value, ...)
```

Arguments

An object.

value A character vector of the new parameter names.

... Other arguments passed to methods.

Details

value must be a unique character vector of the same length as the object's parameters.

Value

The modified object.

See Also

```
Other parameters: npars(), pars()
```

Examples

```
term <- as_term(c("b[2]", "a[1]", "b[3,3]"))
set_pars(term, c("x", "y"))</pre>
```

subset.term

Subset Term Vector

Description

Subsets a term vector.

Usage

```
## S3 method for class 'term'
subset(x, pars = NULL, select = NULL, ...)
```

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Arguments

x The object.

pars A character vector of parameter names.

select A character vector of the names of the parameters to include in the subsetted

object.

... Unused.

Details

The select argument is **Defunct**.

Value

The modified term vector.

See Also

```
term-vector()
```

Examples

```
term <- term(
   "alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]",
   "beta[1,2]", "beta[2,2]", "sigma"
)
subset(term, "beta")
subset(term, c("alpha", "sigma"))</pre>
```

subset.term_rcrd

Subset Term Record

Description

Subsets a term_rcrd.

Usage

```
## S3 method for class 'term_rcrd'
subset(x, pars = NULL, ...)
```

Arguments

x The object.

pars A character vector of parameter names.

... Unused.

Value

The modified term vector.

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See Also

```
term_rcrd_object()
```

Examples

```
term_rcrd <- term_rcrd(
   "alpha[1]", "alpha[2]", "beta[1,1]", "beta[2,1]",
   "beta[1,2]", "beta[2,2]", "sigma"
)
## Not run:
subset(term_rcrd, "beta")
subset(term_rcrd, c("alpha", "sigma"))
## End(Not run)</pre>
```

term

Term Vector

Description

Creates a term vector from values. A term vector is an S3 vector of parameter terms of the form p, q[#] or r[#,#] where # are positive integers. This function checks that all terms are valid but does not require stronger levels of consistency, see chk_valid() for details.

Usage

```
term(...)
```

Arguments

... Unnamed values are term values, named values describe the parameter in the name and the dimensionality in the value.

Value

A term vector.

See Also

```
dims() and pdims()
```

```
term()
term("p", "q[1]", "q[2]", "q[3]")
term("q[1]", "q[2]", "q[3]")
combined <- term(par = 2:4, "alpha")
pdims(combined)
term(!!!pdims(combined))

# Invalid terms are rejected:
try(term("r["))

# Valid terms are repaired
term("r [ 1 ,2 ]")</pre>
```

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term_rcrd

Term Record

Description

Creates a term_rcrd from values. This function checks that all terms are valid but does not require stronger levels of consistency, see chk_valid() for details.

Usage

```
term_rcrd(...)
```

Arguments

... Unnamed values are term values, named values describe the parameter in the name and the dimensionality in the value.

Value

A term_rcrd vector.

See Also

```
dims() and pdims()
```

Examples

```
term_rcrd()
## Not run:
term_rcrd("p", "q[1]", "q[2]", "q[3]")
term_rcrd("q[1]", "q[2]", "q[3]")
## End(Not run)
```

tindex

Term Index

Description

Gets the index for each term of an term or term_rcrd object.

Usage

```
tindex(x)
```

Arguments

Х

The object.

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Details

For example the index of beta[2,1] is c(2L,1L) while the index for sigma is 1L. It is useful for extracting the values of individual terms.

Value

A named list of integer vectors of the index for each term.

Examples

```
tindex(term("alpha", "alpha[2]", "beta[1,1]", "beta[2 ,1 ]"))
```

valid_term

Valid Terms

Description

Test whether each element in a term or term_rcrd object is valid.

Usage

```
valid_term(x)
```

Arguments

Χ

The object.

Details

Repairing a term vector replaces invalid terms with missing values.

Value

A logical vector indicating whether each term is valid.

See Also

```
term-vector() and repair_terms()
```

```
# valid term elements
valid_term(term("a", "a [3]", " b [ 1 ] ", "c[1,300,10]"))
# invalid term elements
valid_term(new_term(c("a b", "a[1]b", "a[0]", "b[1,]", "c[]", "d[1][2]")))
```

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vld_term

Validate Term or Term Record

Description

Validates the elements of a term or term_rcrd vector. Use chk_s3_class() to check if an object is a term or term_rcrd.

Usage

```
vld_term(x, validate = "complete")
vld_term_rcrd(x, validate = "complete")
```

Arguments

x The object.

validate

A string specifying the level of the validation. The possible values in order of increasing strictness are 'class', 'valid', 'consistent' and 'complete'.

Details

Internal validity of a term can be checked on three levels:

- "valid" checks that all terms are of the form x, x[#], x[#,#] etc. where x is an identifier and # are positive integers.
- "consistent" checks that all terms are addressed with the same dimensionality; the terms x[1] and x[2,3] are inconsistent.
- "complete" checks that the values span all possible values across all dimensions; if x[3,4] exist, the vector must contain at least 11 more terms to be consistent (x[1,1] to x[1,4], x[2,1] to x[2,4] and x[3,1] to x[3,3]).

Missing values are ignored as are duplicates and order.

Value

A flag indicating whether the condition was met.

Functions

• vld_term_rcrd: Validate Term Record

See Also

```
chk_term()
```

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```
# vld_term
vld_term(c("x[2]", "x[1]"))
vld_term(term("x[2]", "x[1]"))

# vld_term_rcrd
vld_term_rcrd(c("x[2]", "x[1]"))
vld_term_rcrd(term_rcrd("x[2]", "x[1]"))
```

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