Package: pci (via r-universe)

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Title A Collection of Process Capability Index Functions

Version 1.0.1

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Description A collection of process capability index functions, such
as C_p(), C_pk(), C_pm(), and others, along with metadata about
each, like 'LaTeX' equations and 'R' expressions. Its primary
purpose is to form a foundation for other quality control
packages to build on top of, by providing basic resources and
functions. The indices belong to the field of statistical
quality control, and quantify the degree to which a
manufacturing process is able to create items that adhere to a
certain standard of quality. For details see Montgomery, D. C.
(2019, ISBN:978-1-119-39930-8).

License GPL-3

Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.1

Imports vek (>= 1.0.0)

Depends R (>= 4.0.0)

LazyData true

Suggests tinytest (>= 1.4.1), devtools (>= 2.4.5)

URL https://github.com/samsemegne/pci

Repository https://samsemegne.r-universe.dev

RemoteUrl https://github.com/samsemegne/pci

RemoteRef HEAD

RemoteSha 31ec2aaa5e34241f316cfa8f3a343f2cf77168f7

Contents

C_p C_p

Description

$$C_p = \frac{\text{USL} - \text{LSL}}{L\sigma}$$

Only vectors of length 1 are recycled.

NA's take precedence over NaN's, e.g. NaN + NA will output NA.

Yields NaN if sigma equals 0.

Usage

```
C_p(sigma, lsl, usl, dl)
```

Arguments

sigma   numeric.

lsl   numeric.

usl   numeric.

dl   numeric. L, conventionally set to 6. Must be greater than 0.

Value

double.

References

Montgomery, D. C. (2019). *Introduction to statistical quality control* (8th ed.). Wiley. ISBN: 978-1-119-39930-8

Examples

```
set.seed(1L)
data = rnorm(n = 30L, mean = 3., sd = 1.)
C_p(sigma = sd(data), lsl = 0., usl = 6., dl = 6.)
# [1] 1.08211
```

C_pk C_pk

Description

$$C_{pk} = \min(C_{pl}, C_{pu})$$

Note. This function allows for negative C_{pk} values.

Only vectors of length 1 are recycled.

NA's take precedence over NaN's, e.g. NaN + NA will output NA.

Yields NaN if sigma equals 0.

Usage

```
C_pk(mu, sigma, lsl, usl, dl)
```

Arguments

mu	numeric.
sigma	numeric.
lsl	numeric.
usl	numeric.
dl	numeric. Conventionally set to 6. Must be greater than 0.

Value

double.

References

Montgomery, D. C. (2019). *Introduction to statistical quality control* (8th ed.). Wiley. ISBN: 978-1-119-39930-8

See Also

C_pl(), C_pu()

Examples

```
set.seed(1L)
data = rnorm(n = 30L, mean = 3., sd = 1.)
C_pk(mu = mean(data), sigma = sd(data), lsl = 0., usl = 6., dl = 6.)
# [1] 1.052367
```

C_pl   *C_pl*

Description

$$C_{pl} = \frac{\mu - \text{LSL}}{L\sigma}$$

Note. This function allows for negative C_{pl} values.

Only vectors of length 1 are recycled.

NA's take precedence over NaN's, e.g. NaN + NA will output NA.

Yields NaN if sigma equals 0.

Usage

```
C_pl(mu, sigma, lsl, l)
```

Arguments

mu	numeric.
sigma	numeric.
lsl	numeric.
l	numeric. Conventionally set to 3. Must be greater than 0.

Value

double.

References

Montgomery, D. C. (2019). *Introduction to statistical quality control* (8th ed.). Wiley. ISBN: 978-1-119-39930-8

See Also

C_pu(), C_pk()

Examples

```
set.seed(1L)
data = rnorm(n = 30L, mean = 3., sd = 1.)
C_pl(mu = mean(data), sigma = sd(data), lsl = 0., l = 3.)
# [1] 1.111853
```

C_pm C_pm

Description

$$C_{pm} = \frac{\text{USL} - \text{LSL}}{L\sqrt{\sigma^2 + (\mu - T)^2}}$$

Only vectors of length 1 are recycled.

NA's take precedence over NaN's, e.g. NaN + NA will output NA.

Yields NaN if sigma == 0 and mu == target.

Usage

```
C_pm(mu, sigma, target, lsl, usl, dl)
```

Arguments

mu	numeric.
sigma	numeric.
target	numeric. T.
lsl	numeric.
usl	numeric.
dl	numeric. L, conventionally set to 6. Must be greater than 0.

Value

double.

References

Montgomery, D. C. (2019). *Introduction to statistical quality control* (8th ed.). Wiley. ISBN: 978-1-119-39930-8

Examples

```
set.seed(1L)
data = rnorm(n = 30L, mean = 3., sd = 1.)
C_pm(mu = mean(data), sigma = sd(data), target = 3., lsl = 0., usl = 6., dl = 6.)
# [1] 1.077827
```

C_pu C_pu

Description

$$C_{pu} = \frac{\text{USL} - \mu}{L\sigma}$$

Note. This function allows for negative C_{pu} values.

Only vectors of length 1 are recycled.

NA's take precedence over NaN's, e.g. NaN + NA will output NA.

Yields NaN if sigma equals 0.

Usage

```
C_pu(mu, sigma, usl, l)
```

Arguments

mu	numeric.
sigma	numeric.
usl	numeric.
l	numeric. Conventionally set to 3. Must be greater than 0.

Value

double.

References

Montgomery, D. C. (2019). *Introduction to statistical quality control* (8th ed.). Wiley. ISBN: 978-1-119-39930-8

See Also

C_pl(), C_pk()

Examples

```
set.seed(1L)
data = rnorm(n = 30L, mean = 3., sd = 1.)
C_pu(mu = mean(data), sigma = sd(data), usl = 6., l = 3.)
# [1] 1.052367
```

---

pci_info	*pci_info*

Description

Metadata about the process capability indices (PCIs).

Format

pci_info:

pci_id character. The ID of the PCI. Corresponds to the row name of the data.frame in R.

name_r character. The variable name of the PCI, as may be referred to by other metadata fields that contain R code.

name_latex character. The name of the PCI in LaTeX format.

name_r_expr character. The name of the PCI in R expression format, useful for working with plot labels or texts in R. To be used with str2expression(text) in R.

expr_r character. An R expression of the PCI, in expanded form. Variable names match parameter names of the PCI's function provided by the package. Can be used with str2expression(text) in R.

eq_latex character. An equation of the PCI in LaTeX format.

attributes AsIs. The attributes column is essentially an unnamed list, thus being a nested data structure. Each element belonging to a PCI is again an unnamed list, which holds the actual attributes for that PCI. Each attribute is a named list. Attributes detail additional technical information about the PCI or its related concepts, e.g. the bounds of the PCI. Note, all information pertains to the PCI's function provided by the package. Each actual attribute has a 'type' (single character) field, may have a 'target' (character) field, followed by fields specific to that attribute type. The 'target' field indicates which entity the attribute belongs to, e.g. the PCI or one of its terms.

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