

# Package ‘broman’

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**Title** Karl Broman's R Code

**Description** Miscellaneous R functions, including functions related to graphics (mostly for base graphics), permutation tests, running mean/median, and general utilities.

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---

|            |                                     |
|------------|-------------------------------------|
| add_commas | <i>Add commas to a large number</i> |
|------------|-------------------------------------|

---

**Description**

Convert a number to a string, with commas every 3rd digit

**Usage**

add\_commas(numbers)

**Arguments**

numbers                      Vector of non-negative numbers (will be rounded to integers)

**Value**

Character string with numbers written like "7,547,085".

**Examples**

add\_commas(c(231, 91310, 2123, 9911001020, 999723285))

---

|                            |                          |
|----------------------------|--------------------------|
| <code>align_vectors</code> | <i>Align two vectors</i> |
|----------------------------|--------------------------|

---

### Description

Align two vectors using their names attributes, either expanding with NAs or reducing to the common values.

### Usage

```
align_vectors(x, y, expand = TRUE)
```

### Arguments

|                     |                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------|
| <code>x</code>      | A vector                                                                                    |
| <code>y</code>      | Another vector                                                                              |
| <code>expand</code> | If TRUE, expand each to the same length using NAs. If FALSE, remove elements not in common. |

### Value

A list with two components, `x` and `y`

---

|                           |                                                  |
|---------------------------|--------------------------------------------------|
| <code>arrowlocator</code> | <i>Use the locator function to plot an arrow</i> |
|---------------------------|--------------------------------------------------|

---

### Description

Use the `graphics::locator()` function to indicate the endpoints of an arrow and then plot it.

### Usage

```
arrowlocator(
  reverse = FALSE,
  horizontal = FALSE,
  vertical = FALSE,
  length = 0.1,
  ...
)
```

**Arguments**

|            |                                                                                                                                    |
|------------|------------------------------------------------------------------------------------------------------------------------------------|
| reverse    | If FALSE, first indicate the tail of the arrow and then the head; if TRUE, first indicate the head of the arrow and then the tail. |
| horizontal | If TRUE, force the arrow to be horizontal. (Use the average y-axis value of the two clicks for the vertical placement.)            |
| vertical   | If TRUE, force the arrow to be vertical. (Use the average x-axis value of the two clicks for the horizontal placement.)            |
| length     | Length of the edges of the arrow head.                                                                                             |
| ...        | Additional graphics parameters                                                                                                     |

**Details**

Use `graphics::locator()` to indicate the two endpoints of an arrow and then draw it.

**Value**

The locations of the endpoints of the arrow, as a two-row matrix. The first row indicates the location of the tail of the arrow; the second row indicates the location of the head of the arrow.

**See Also**

`graphics::arrows()`, `graphics::locator()`

**Examples**

```
## Not run:
plot(0,0,type="n", xlab="", ylab="", xlim=c(0,100), ylim=c(0,100))
arrowlocator(col="blue", lwd=2)

## End(Not run)
```

---

attrnames

*Get names of attributes*


---

**Description**

Get the names of the attributes of an object

**Usage**

```
attrnames(object)
```

**Arguments**

object      Any object

**Details**

It just does `names(attributes(object))`.

**Value**

Vector of character strings with the names of the attributes.

**Examples**

```
x <- matrix(1:100, ncol=5)
colnames(x) <- LETTERS[1:5]
attrnames(x)
```

---

|           |                                      |
|-----------|--------------------------------------|
| brocolors | <i>Vectors of colors for figures</i> |
|-----------|--------------------------------------|

---

**Description**

Creates different vectors of related colors that may be useful for figures.

**Usage**

```
brocolors(
  set = c("general", "general2", "bg", "bgpng", "CC", "CCalt", "f2", "sex", "main",
    "crayons", "web")
)
```

**Arguments**

`set`                      Character string indicating a set of colors.

**Value**

Vector of character strings representing the chosen set of colors, in RGB.

**See Also**

[plot\\_crayons\(\)](#)

**Examples**

```
par(mar=c(0.6,5.1,0.6,0.6))
plot(0, 0, type="n", xlab="", ylab="", xlim=c(0, 9), ylim=c(8.5, 0), yaxs="i",
     xaxt="n", yaxt="n", xaxs="i")
axis(side=2, at=1:8, c("general", "general2", "bg", "bgpng", "CC", "f2", "sex", "main"), las=1)

gen <- brocolors("general")
points(seq(along=gen), rep(1,length(gen)), pch=21, bg=gen, cex=4)
text(seq(along=gen), rep(c(0.55, 0.7), length(gen))[seq(along=gen)], names(gen))
```

```

gen2 <- brocolors("general2")
points(seq(along=gen2), rep(2,length(gen2)), pch=21, bg=gen2, cex=4)
text(seq(along=gen2), rep(1+c(0.55, 0.7), length(gen2))[seq(along=gen2)], names(gen2))

points(1, 3, pch=21, bg=brocolors("bg"), cex=4)
points(1, 4, pch=21, bg=brocolors("bgpng"), cex=4)

CC <- brocolors("CC")
points(seq(along=CC), rep(5,length(CC)), pch=21, bg=CC, cex=4)
text(seq(along=CC), rep(4+c(0.55, 0.7), length(CC))[seq(along=CC)], names(CC))

f2 <- brocolors("f2")
points(seq(along=f2), rep(6,length(f2)), pch=21, bg=f2, cex=4)
text(seq(along=f2), rep(5.7, length(f2)), names(f2))

sex <- brocolors("sex")
points(seq(along=sex), rep(7,length(sex)), pch=21, bg=sex, cex=4)
text(seq(along=sex), rep(6.7, length(sex)), names(sex))

points(1, 8, pch=21, bg=brocolors("main"), cex=4)

```

---

bromanversion

*Installed version of R/broman*


---

## Description

Print the version number of the currently installed version of R/broman.

## Usage

```
bromanversion()
```

## Value

A character string with the version number of the currently installed version of R/broman.

## Examples

```
bromanversion()
```

---

|    |                                                        |
|----|--------------------------------------------------------|
| cf | <i>Compare objects, including missing data pattern</i> |
|----|--------------------------------------------------------|

---

**Description**

Check whether two objects are the same, including their patterns of NAs.

**Usage**

```
cf(a, b)
```

**Arguments**

|   |                |
|---|----------------|
| a | Some object.   |
| b | Another object |

**Details**

It's not very complicated: `((is.na(a) & is.na(b)) | (!is.na(a) & !is.na(b) & a == b))`

**Value**

Boolean object with TRUE indicating an element is the same.

**Examples**

```
x <- c(5, 8, 9, NA, 3, NA)
y <- c(5, 2, 9, 4, NA, NA)
cf(x,y)

x <- matrix(rnorm(1000), ncol=20)
x[sample(seq(along=x), 100)] <- NA
all(cf(x,x))
dim(cf(x,x))

y <- x
y[4,8] <- NA
sum(!cf(x,y))
y[6,2] <- 18
sum(!cf(x,y))
y[6,5] <- 32
sum(!cf(x,y))

x <- as.data.frame(x)
y <- as.data.frame(y)
sum(!cf(x,y))

x <- as.list(x)
y <- as.list(y)
```



```
sapply(cf(x,y), function(a) sum(!a))
```

---

**chisq***Chi-square test by simulation for a two-way table*

---

## Description

Calculate a p-value for a chi-square test by Monte Carlo simulation.

## Usage

```
chisq(tab, n.sim = 1000)
```

## Arguments

|                    |                                                   |
|--------------------|---------------------------------------------------|
| <code>tab</code>   | A matrix of counts.                               |
| <code>n.sim</code> | Number of samples of permuted tables to consider. |

## Details

This is like the function `stats::chisq.test()`, but calculates an approximate P-value rather than referring to asymptotics. This will be better for large, sparse tables.

## Value

A single number: the P-value testing independence of rows and columns in the table.

## See Also

`stats::chisq.test()`, `stats::fisher.test()`, `fisher()`

## Examples

```
TeaTasting <- matrix(c(3,1,1,3),nrow=2)
chisq(TeaTasting,1000)
```

ciplot

*Effect plot with multiple CIs for different groups***Description**

Uses `grayplot()` to plot a set of confidence intervals.

**Usage**

```
ciplot(
  est,
  se = NULL,
  lo = NULL,
  hi = NULL,
  SEMult = 2,
  labels = NULL,
  rotate = FALSE,
  ...
)
```

**Arguments**

|                     |                                                                     |
|---------------------|---------------------------------------------------------------------|
| <code>est</code>    | Vector of estimates                                                 |
| <code>se</code>     | Vector of standard errors                                           |
| <code>lo</code>     | Vector of lower values for the intervals                            |
| <code>hi</code>     | Vector of upper values for the intervals                            |
| <code>SEMult</code> | SE multiplier to create intervals                                   |
| <code>labels</code> | Labels for the groups (vector of character strings)                 |
| <code>rotate</code> | If TRUE, have group as y-axis; default (FALSE) has group on x-axis. |
| <code>...</code>    | Optional graphics arguments                                         |

**Details**

Calls `grayplot()` with special choices of graphics parameters, as in `dotplot()`.

Provide either `se` or both `lo` and `hi`. In the case that `se` is used, the intervals will be  $\text{est} \pm \text{SEMult} * \text{se}$ .

If `labels` is not provided, group names are taken from the `names(est)`. If that is also missing, we use capital letters.

You can control the CI line widths with `ci_lwd` and the color of the CI segments with `ci_col`. You can control the width of the segments at the top and bottom with `ci_endseg`.

**Value**

None.

**See Also**

`grayplot()`, `dotplot()`

**Examples**

```
x <- rnorm(40, c(1,3))
g <- rep(c("A", "B"), 20)
me <- tapply(x, g, mean)
se <- tapply(x, g, function(a) sd(a)/sqrt(sum(!is.na(a))))
ciplot(me, se) # default is +/- 2 SE
ciplot(me, se, SEMult=1)
ciplot(me, se, rotate=TRUE)
lo <- me - 2*se
hi <- me + 2*se
ciplot(me, lo=lo, hi=hi)
```

---

colwalpha

---

*Convert a color to use alpha transparency*


---

**Description**

Convert a color to RGB and then to RGB with alpha transparency

**Usage**

```
colwalpha(color, alpha = 1)
```

**Arguments**

|       |                                      |
|-------|--------------------------------------|
| color | A character string for a color       |
| alpha | Transparency value (between 0 and 1) |

**Value**

A character string representing a color

**Examples**

```
colwalpha(c("blue", "red"), 0.5)
```

---

|              |                                 |
|--------------|---------------------------------|
| compare_rows | <i>Compare rows in a matrix</i> |
|--------------|---------------------------------|

---

**Description**

For all pairs of rows in a matrix, calculate the proportion of mismatches or the RMS difference.

**Usage**

```
compare_rows(mat, method = c("prop_mismatches", "rms_difference"))
```

**Arguments**

|        |                                                                                                   |
|--------|---------------------------------------------------------------------------------------------------|
| mat    | Numeric matrix. Should be integers in the case method="prop_mismatches".                          |
| method | Indicates whether to use proportion mismatches or the RMS difference. Missing values are omitted. |

**Value**

A square matrix of dimension `nrow(mat)` with NAs on the diagonal and the calculated statistic in the body.

**Examples**

```
n <- 10
p <- 200
x <- matrix(sample(1:4, n*p, replace=TRUE), ncol=p)
d <- compare_rows(x)
```

---

|             |                               |
|-------------|-------------------------------|
| convert2hex | <i>Convert decimal to hex</i> |
|-------------|-------------------------------|

---

**Description**

Convert a number to hexadecimal notation.

**Usage**

```
convert2hex(d)
```

**Arguments**

|   |                                             |
|---|---------------------------------------------|
| d | A vector of integers (must be $< 2^{31}$ ). |
|---|---------------------------------------------|

**Value**

The input in hex, as character strings.

**See Also**[hex2dec\(\)](#)**Examples**

```
convert2hex(333)
dec2hex(333)
dec2hex(0:30)
```

---

|         |                      |
|---------|----------------------|
| crayons | <i>Crayon colors</i> |
|---------|----------------------|

---

**Description**

Vector of colors corresponding to Crayola crayons

**Usage**

```
crayons(color_names = NULL, ...)
```

**Arguments**

|             |                                                         |
|-------------|---------------------------------------------------------|
| color_names | Optional vector of color names; can be partial matches. |
| ...         | Additional optional color names                         |

**Value**

Vector of named RGB colors

**References**

[https://en.wikipedia.org/wiki/List\\_of\\_Crayola\\_crayon\\_colors](https://en.wikipedia.org/wiki/List_of_Crayola_crayon_colors)

**See Also**[plot\\_crayons\(\)](#), [brocolors\(\)](#)

dotplot

*Dot chart with a gray background***Description**

Like the `grayplot()` function, but with one axis assumed to be categorical.

**Usage**

```
dotplot(group, y, jiggle = NULL, max_jiggle = 0.45, rotate = FALSE, ...)
```

**Arguments**

|                         |                                                                                                                                                              |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>group</code>      | Categorical coordinates for the plot                                                                                                                         |
| <code>y</code>          | Coordinates of points in the plot                                                                                                                            |
| <code>jiggle</code>     | Vector of amounts to jiggle the points horizontally, or a character string ("fixed" or "random") indicating the jiggling method; see <code>jiggle()</code> . |
| <code>max_jiggle</code> | Maximum jiggle value; passed to <code>jiggle()</code> as argument <code>maxvalue</code> .                                                                    |
| <code>rotate</code>     | If TRUE, have group as y-axis; default (FALSE) has group on x-axis.                                                                                          |
| <code>...</code>        | Optional graphics arguments                                                                                                                                  |

**Details**

Calls `grayplot()` with special choices of graphics parameters for the case of categorical x.

If group is a factor, the order of the groups is as in the levels. Otherwise, we take `sort(unique(group))`.

So if you want to control the order of the levels, make group a factor with the levels in the desired order, for example `group <- factor(group, levels=unique(group))`.

**Value**

None.

**See Also**

`grayplot()`, `timeplot()`

**Examples**

```
x <- rnorm(40, c(1,3))
g <- rep(c("A", "B"), 20)
dotplot(g, x)
dotplot(g, x, "fixed")
dotplot(g, x, runif(length(g), -0.25, 0.25))
```

excel\_fig

*Excel-style figure displaying contents of a matrix***Description**

Turn a matrix of data into an SVG of how it might look in Excel

**Usage**

```
excel_fig(
  mat,
  file = NULL,
  cellwidth = 80,
  cellheight = 26,
  textsize = 16,
  fig_width = NULL,
  fig_height = NULL,
  border = "#CECECE",
  headcol = "#E9E9E9",
  headborder = "#969696",
  headtextcol = "#626262",
  textcol = "black",
  row_names = FALSE,
  col_names = TRUE,
  hilitcells = NULL,
  hilitcolor = "#F0DCDB",
  lwd = 1,
  direct2svg = FALSE,
  mar = rep(0.1, 4)
)
```

**Arguments**

|            |                                                                                             |
|------------|---------------------------------------------------------------------------------------------|
| mat        | A matrix                                                                                    |
| file       | Optional file name (must have extension .svg, .png, .jpg, or .pdf)                          |
| cellwidth  | Width of each cell, in pixels                                                               |
| cellheight | Height of each cell, in pixels                                                              |
| textsize   | Size for text (if file is provided or direct2svg=TRUE)                                      |
| fig_width  | Width of figure, in pixels (if NULL, taken from cellwidth); ignored when direct2svg=FALSE   |
| fig_height | Height of figure, in pixels (if NULL, taken from cellheight); ignored when direct2svg=FALSE |
| border     | Color of border of cells for the body of the matrix                                         |
| headcol    | Background color of cells on the top and left border                                        |

|             |                                                                                             |
|-------------|---------------------------------------------------------------------------------------------|
| headborder  | Color of border of cells on the top and left border                                         |
| headtextcol | Color of text in cells on the top and left border                                           |
| textcol     | Color of text in cells in body of the matrix                                                |
| row_names   | If TRUE, and row names are present, include them as a first column                          |
| col_names   | If TRUE, and column names are present, include them as a first row                          |
| hilitcells  | Optional character vector of cells to highlight, like "A1" or "D4"                          |
| hilitcolor  | Color to highlight cells, a vector of length 1 or the same length as hilitcells             |
| lwd         | Line width for rectangles                                                                   |
| direct2svg  | If TRUE, rather than R graphics, just print an SVG directly with <code>base::cat()</code> . |
| mar         | Plot margins, passed to <code>graphics::par()</code> .                                      |

Examples

```
df <- data.frame(id= c(101, 102, 103),
                 sex= c("M", "F", "M"),
                 weight=c(22.3, 15.8, 19.7),
                 stringsAsFactors=FALSE)
excel_fig(df, col_names=TRUE)
```

---

|      |                              |
|------|------------------------------|
| exit | <i>exit R without saving</i> |
|------|------------------------------|

---

Description

exit R without saving workspace.

Usage

```
exit()
```

Details

This just calls `q("no")`

Value

None.



---

|         |                                    |
|---------|------------------------------------|
| fac2num | <i>Convert a factor to numeric</i> |
|---------|------------------------------------|

---

**Description**

Convert a factor with numeric levels to a non-factor

**Usage**

```
fac2num(x)
```

**Arguments**

|   |                                                  |
|---|--------------------------------------------------|
| x | A vector containing a factor with numeric levels |
|---|--------------------------------------------------|

**Value**

The input factor made a numeric vector

**Examples**

```
x <- factor(c(3, 4, 9, 4, 9), levels=c(3,4,9))
fac2num(x)
```

---

|        |                                                |
|--------|------------------------------------------------|
| fisher | <i>Fisher's exact test for a two-way table</i> |
|--------|------------------------------------------------|

---

**Description**

Performs a sampling version of Fisher's exact test for a two-way contingency table.

**Usage**

```
fisher(tab, n.sim = 1000)
```

**Arguments**

|       |                                                   |
|-------|---------------------------------------------------|
| tab   | A matrix of counts.                               |
| n.sim | Number of samples of permuted tables to consider. |

**Details**

This is like the function `stats::fisher.test()`, but calculates an approximate P-value rather than performing a complete enumeration. This will be better for large, sparse tables.

**Value**

A single number: the P-value testing independence of rows and columns in the table.

**See Also**

```
stats::chisq.test(), stats::fisher.test(), chisq()
```

**Examples**

```
TeaTasting <- matrix(c(3,1,1,3),nrow=2)
fisher(TeaTasting,1000)
```

---

|               |                                            |
|---------------|--------------------------------------------|
| get_precision | <i>Determine the precision of a number</i> |
|---------------|--------------------------------------------|

---

**Description**

Determine the precision of a number, as the number of digits past the decimal point.

**Usage**

```
get_precision(x, ...)
```

**Arguments**

- x                    A numeric vector
- ...                  Ignore this

**Details**

If the number is expressed in scientific notation, we take the number of digits

**Value**

A vector of integers, with the number of digits (to the last non-zero digit) past the decimal point.

---

grayplot

*Scatterplot with a gray background*


---

### Description

Like the plot function, but using a gray background just for the plot region.

### Usage

```
grayplot(
  x,
  y = NULL,
  ...,
  type = "p",
  hlines = NULL,
  hlines.col = "white",
  hlines.lty = 1,
  hlines.lwd = 1,
  vlines = NULL,
  vlines.col = "white",
  vlines.lty = 1,
  vlines.lwd = 1,
  xat = NULL,
  yat = NULL,
  bgcolor = "gray90",
  pch = 21,
  bg = "lightblue",
  col = "black",
  v_over_h = FALSE
)
```

### Arguments

|            |                                                                                    |
|------------|------------------------------------------------------------------------------------|
| x          | Coordinates of points in the plot                                                  |
| y          | Coordinates of points in the plot (optional)                                       |
| ...        | Optional graphics arguments                                                        |
| type       | Plot type (points, lines, etc.)                                                    |
| hlines     | Locations of horizontal grid lines; use hlines=NA to prevent horizontal grid lines |
| hlines.col | Colors of horizontal grid lines                                                    |
| hlines.lty | Line type of horizontal grid lines                                                 |
| hlines.lwd | Line width of horizontal grid lines                                                |
| vlines     | Locations of vertical grid lines; use vlines=NA to prevent vertical grid lines     |
| vlines.col | Colors of vertical grid lines                                                      |

|                         |                                                                      |
|-------------------------|----------------------------------------------------------------------|
| <code>vlines.lty</code> | Line type of vertical grid lines                                     |
| <code>vlines.lwd</code> | Line width of vertical grid lines                                    |
| <code>xat</code>        | Locations for x-axis labels; <code>xat=NA</code> indicates no labels |
| <code>yat</code>        | Locations for y-axis labels; <code>yat=NA</code> indicates no labels |
| <code>bgcolor</code>    | Background color                                                     |
| <code>pch</code>        | point type                                                           |
| <code>bg</code>         | Background color in points                                           |
| <code>col</code>        | Color of outer circle in points                                      |
| <code>v_over_h</code>   | If TRUE, place vertical grid lines on top of the horizontal ones.    |

### Details

Calls `plot()` with `type="n"`, then `graphics::rect()` to get the background, and then `graphics::points()`. Additional arguments you can include: `mgp.x` and `mgp.y` (like `mgp`, for controlling parameters of axis labels, but separate for x- and y-axis).

### Value

None.

### See Also

`dotplot()`, `timeplot()`, `graphics::par()`, `graphics::rect()`, `graphics::points()`

### Examples

```
x <- rnorm(100)
y <- x+rnorm(100, 0, 0.7)
grayplot(x, y, col="slateblue", pch=16)
at <- seq(-3, 3)
grayplot(x, y, col="violetred", pch=16, hlines=at, vlines=at)
grayplot(x, col="Orchid", pch=16, bgcolor="gray80",
         hlines=seq(-4, 4, by=0.5), hlines.lwd=c(3,1),
         vlines=seq(0, 100, by=5), vlines.lwd=c(3,1,1,1))
```

---

grayplot\_na

*Scatterplot with missing values indicated*

---

### Description

Scatterplot with a gray background and with points with missing values shown in separate panels near the margins.

**Usage**

```
grayplot_na(
  x,
  y = NULL,
  type = "p",
  bgcolor = "gray90",
  v_over_h = FALSE,
  pch = 21,
  bg = "lightblue",
  col = "black",
  force = c("none", "x", "y", "both"),
  ...
)
```

**Arguments**

|          |                                                                                                               |
|----------|---------------------------------------------------------------------------------------------------------------|
| x        | Coordinates of points in the plot                                                                             |
| y        | Coordinates of points in the plot (optional)                                                                  |
| type     | Plot type (points, lines, etc.)                                                                               |
| bgcolor  | Background color                                                                                              |
| v_over_h | If TRUE, place vertical grid lines on top of the horizontal ones.                                             |
| pch      | point type                                                                                                    |
| bg       | Background color in points                                                                                    |
| col      | Color of outer circle in points                                                                               |
| force    | Indicates whether to force the NA box (on the x-axis, y-axis, or both) even when there are no missing values. |
| ...      | Optional graphics arguments                                                                                   |

**Details**

Calls `plot()` with `type="n"`, then `graphics::rect()` to get the background, and then `graphics::points()`.

There are a bunch of hidden graphical arguments you can include: `na.width` controls the proportional width devoted to the NA boxes, and `na.gap` the proportion for the gap between the NA boxes and the main plot region. `mgp.x` and `mgp.y` (like `mgp`, for controlling parameters of axis labels, but separate for x- and y-axis). Also `hlines` to indicate locations of horizontal gridlines, and `hlines.col`, `hlines.lwd`, and `hlines.lty` to set their color, width, and type. `hlines=NA` suppresses the grid lines. Similarly `vlines`, `vlines.col`, `vlines.lwd`, and `vlines.lty`. `xat` and `yat` are for specifying the locations of x- and y-axis labels, respectively. `xat=NA` and `yat=NA` indicate no labels.

**Value**

None.

**See Also**

[grayplot\(\)](#), [dotplot\(\)](#)

**Examples**

```
n <- 100
x <- rnorm(n)
y <- x+rnorm(n, 0, 0.7)
x[sample(n, 10)] <- NA

grayplot_na(x, y)

grayplot_na(x, y, force="y")

y[sample(n, 10)] <- NA
grayplot_na(x, y)
```

---

h

*View html version of help file*

---

**Description**

View the html version of a help file while running R via ESS within emacs.

**Usage**

```
h(...)
```

**Arguments**

...                    Help topics.

**Details**

This just calls the function `utils::help()` using the argument `htmlhelp=TRUE`.

**Value**

No return value.

**See Also**

`utils::help()`, `utils::help.start()`

**Examples**

```
h(read.cross)
```

---

|         |                                    |
|---------|------------------------------------|
| hex2dec | <i>Convert from hex to decimal</i> |
|---------|------------------------------------|

---

**Description**

Convert a number from hexadecimal to decimal notation.

**Usage**

```
hex2dec(h)
```

**Arguments**

|   |                                                                                                                         |
|---|-------------------------------------------------------------------------------------------------------------------------|
| h | Vector of character strings with hexadecimal representation of integers (values $\geq 2^{31}$ converted to missing, NA) |
|---|-------------------------------------------------------------------------------------------------------------------------|

**Value**

The input converted from hexadecimal to decimal notation.

**Author(s)**

Karl W Broman, <broman@wisc.edu>

**See Also**

[dec2hex\(\)](#)

**Examples**

```
hex2dec("14D")
hex2dec(0:30)
```

---

|           |                                               |
|-----------|-----------------------------------------------|
| histlines | <i>Utility to create line-based histogram</i> |
|-----------|-----------------------------------------------|

---

**Description**

Utility function to plot histogram with [graphics::lines\(\)](#).

**Usage**

```
histlines(x, y = NULL, breaks, use = c("counts", "density"))
```

**Arguments**

|        |                                                               |
|--------|---------------------------------------------------------------|
| x      | Either vector of breaks or the data itself.                   |
| y      | Optional vector of density/counts, with length = length(x)-1. |
| breaks | Breaks for histogram, if y is not provided.                   |
| use    | Whether to use counts or density, if y is not provided.       |

**Details**

If x and y are both provided, x is interpreted to be the breaks for a histogram, and y is a vector of counts or density values for each interval. These are then revised so that they may be plotted with `graphics::lines()`. If y is NULL, x is taken to be the data. In this case `graphics::hist()` is called with breaks=breaks, and either the counts or density are used as y.

**Value**

A data.frame with two columns: x and y.

**See Also**

`graphics::hist()`, `graphics::lines()`

**Examples**

```
x <- rnorm(1000, mean=20, sd=5)
# basic use
out <- hist(x, breaks=60, plot=FALSE)
plot(histlines(out$breaks, out$counts),
     type="l", lwd=2, xlab="x", ylab="counts", las=1)
# alternative use
plot(histlines(x, breaks=60, use="density"),
     type="l", lwd=2, xlab="x", ylab="Density", las=1)
# comparing two distributions
z <- rnorm(1000, mean=25, sd=5)
br <- seq(min(c(x,z)), max(c(x,z)), len=50)
xlines <- histlines(x, breaks=br, use="density")
zlines <- histlines(z, breaks=br, use="density")
ymx <- max(c(xlines$y, zlines$y))*1.05
plot(xlines, ylim=c(0, ymx), yaxs="i", xaxs="i",
     type="l", lwd=2, xlab="x", ylab="Density", las=1,
     col="blue")
lines(zlines, lwd=2, col="red")
```



---

jiggle*Jiggle points horizontally*

---

### Description

Spread points out horizontally so that, in dot plot of quantitative response in multiple categories, the separate points can be seen.

### Usage

```
jiggle(  
  group,  
  y,  
  method = c("random", "fixed"),  
  hnum = 35,  
  vnum = 40,  
  maxvalue = 0.45  
)
```

### Arguments

|          |                                                                                            |
|----------|--------------------------------------------------------------------------------------------|
| group    | Categorical variable defining group; can be a factor, character, or numeric vector         |
| y        | Vector of quantitative responses                                                           |
| method   | What method to use for horizontal jiggling.                                                |
| hnum     | Number of horizontal bins for the jiggling.                                                |
| vnum     | Number of vertical bins for the jiggling.                                                  |
| maxvalue | Maximum value in the results; results will be scaled to this value. Use NULL to not scale. |

### Details

The "random" method is similar to [base::jitter\(\)](#) but with amount of jiggling proportional to the number of nearby points. The "fixed" method is similar to the [beeswarm package](#)

### Value

Numeric vector with amounts to jiggle the points horizontally

### See Also

[base::jitter\(\)](#), [dotplot\(\)](#)

---

|        |                                |
|--------|--------------------------------|
| kbdate | <i>My little date facility</i> |
|--------|--------------------------------|

---

**Description**

Sys.Date as a string, in a few different formats

**Usage**

```
kbdate(format = c("dateonly", "standard"), date = Sys.time())
```

**Arguments**

|        |                           |
|--------|---------------------------|
| format | The format for the output |
| date   | The date/time to convert  |

**Value**

A character string representation of the date/time

**See Also**

[base::Sys.time\(\)](#), [base::date\(\)](#)

**Examples**

```
kbdate()
kbdate("standard")
```

---

|         |                                |
|---------|--------------------------------|
| lenuniq | <i>Number of unique values</i> |
|---------|--------------------------------|

---

**Description**

Get the number of unique values in a vector

**Usage**

```
lenuniq(vec, na.rm = TRUE)
```

**Arguments**

|       |                                    |
|-------|------------------------------------|
| vec   | A vector                           |
| na.rm | If TRUE, remove any missing values |

**Details**

It just does `length(unique(vec))` or, if `na.rm=TRUE` (the default) `length(unique(vec[!is.na(vec)]))`

**Value**

Number of unique values.

**Examples**

```
x <- c(1, 2, 1, 3, 1, 1, 2, 2, 3, NA, NA, 1)
lenuniq(x)
lenuniq(x, na.rm=FALSE)
```

---

make

*Run make within a package directory*

---

**Description**

Run make within a package directory

**Usage**

```
make(pkg = ".", makefile = "Makefile", target = "", quiet = FALSE)
```

**Arguments**

|          |                                                                                                                                                                                       |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pkg      | Path to directory containing the GNU Make file, or an Rpackage description, which can be a path or a package name. (See <a href="#">devtools::as.package()</a> for more information.) |
| makefile | File name of makefile.                                                                                                                                                                |
| target   | Optional character string specifying the target.                                                                                                                                      |
| quiet    | If TRUE suppresses output from this function.                                                                                                                                         |

**Value**

Exit value from [base::system\(\)](#) with `intern=FALSE`

**See Also**

[devtools::load\\_all\(\)](#)

**Examples**

```
## Not run: make() # run make within working directory
make("/path/to/mypackage") # run make within /path/to/mypackage

## End(Not run)
```

---

manyboxplot

*Boxplot-like figure for many groups*


---

## Description

Boxplot-like figure for many groups, with lines connecting selected quantiles.

## Usage

```
manyboxplot(
  x,
  probs = c(0.05, 0.1, 0.25),
  dotcol = "blue",
  linecol = c("black", "red", "green", "orange"),
  ...
)
```

## Arguments

|         |                                                                                                                            |
|---------|----------------------------------------------------------------------------------------------------------------------------|
| x       | Matrix of data, with columns indicating the groups.                                                                        |
| probs   | Numeric vecotr of probabilities with values in [0,1). Quantiles will be symmetric, and the median will always be included. |
| dotcol  | Color for median                                                                                                           |
| linecol | Line colors, same length as probs                                                                                          |
| ...     | Additional graphics parameters                                                                                             |

## Details

Calculates quantiles of the columns of x and then plots dots or lines at median plus lines at a series of quantiles, using [grayplot\(\)](#) for the actual plot.

## Value

None.

## See Also

[grayplot\(\)](#)

## Examples

```
mu <- c(rnorm(50, 0, 0.3), rnorm(50, 2, 0.3)) # vector of means
x <- t(matrix(rnorm(1000*100, mu), ncol=1000))
manyboxplot(x, c(0.05, 0.25), ylim=range(x),
  dotcol=c("blue","green")[(1:100 > 50) + 1],
  hlines=seq(-4, 6, by=2),
  vlines=c(1, seq(20, 100, by=20)))
```

---

|        |                                  |
|--------|----------------------------------|
| maxabs | <i>maximum of absolute value</i> |
|--------|----------------------------------|

---

**Description**

Take the maximum of the absolute values of the input

**Usage**

```
maxabs(x, na.rm = FALSE)
```

**Arguments**

|       |                                                                |
|-------|----------------------------------------------------------------|
| x     | a numeric vector or array                                      |
| na.rm | a logical indicating whether missing values should be removed. |

**Value**

The maximum of the absolute value of the input

**Examples**

```
x <- c(5, -2, 8, -20, 2.3)
maxabs(x)
```

---

|         |                              |
|---------|------------------------------|
| mypairs | <i>My scatterplot matrix</i> |
|---------|------------------------------|

---

**Description**

A matrix of scatterplots is produced; it's similar to `graphics::pairs()`, but with only the upper triangle is made.

**Usage**

```
mypairs(x, ...)
```

**Arguments**

|     |                                             |
|-----|---------------------------------------------|
| x   | A numeric matrix or data frame.             |
| ... | Passed to the <code>plot()</code> function. |

**Details**

This is like the function `graphics::pairs()`, but only the upper triangle is produced.

**Value**

None.

**See Also**

[graphics::pairs\(\)](#)

**Examples**

```
v <- rbind(c(1,0.5,0.2),c(0.5,1,0.9),c(0.2,0.9,1))
x <- rmvn(500, rep(5,3), v)
mypairs(x, col=sample(c("blue","red"), 500, repl=TRUE))
```

---

myround

*Round a number, preserving extra 0's*


---

**Description**

Round a number, preserving extra 0's.

**Usage**

```
myround(x, digits = 1)
```

**Arguments**

|        |                                                  |
|--------|--------------------------------------------------|
| x      | Number to round.                                 |
| digits | Number of digits past the decimal point to keep. |

**Details**

Uses [base::sprintf\(\)](#) to round a number, keeping extra 0's.

**Value**

A vector of character strings.

**See Also**

[base::round\(\)](#), [base::sprintf\(\)](#)

**Examples**

```
myround(51.01, 3)
myround(0.199, 2)
```

---

normalize

*Quantile normalization*


---

## Description

Quantile normalizes two vectors or a matrix.

## Usage

```
normalize(x, y = NULL)
```

## Arguments

|   |                                |
|---|--------------------------------|
| x | Numeric vector or matrix       |
| y | Optional second numeric vector |

## Details

We sort the columns, take averages across rows, and then plug the averages back into the respective positions. The marginal distributions in the columns are thus forced to be the same. Missing values, which can result in differing numbers of observed values per column, are dealt with by linear interpolation.

## Value

If two vectors, x and y, are provided, the output is a matrix with two columns, with the quantile normalized versions of x and y. If y is missing, x should be a matrix, in which case the output is a matrix of the same dimensions with the columns quantile normalized with respect to each other.

## Examples

```
z <- rmvn(10000, mu=c(0,5,10), V = rbind(c(1,0.5,0.5),c(0.5,1,0.5),c(0.5,0.5,1)))
z[sample(prod(dim(z)), 1500)] <- NA
pairs(z)
br <- seq(min(z, na.rm=TRUE), max(z, na.rm=TRUE), length=200)
par(mfrow=c(3,1))
for(i in 1:3)
  hist(z[,i], xlab="z", main=i, breaks=br)
zn <- normalize(z)
br <- seq(min(zn, na.rm=TRUE), max(zn, na.rm=TRUE), length=200)
for(i in 1:3)
  hist(zn[,i], xlab="normalized z", main=i, breaks=br)
pairs(zn)
```

---

|         |                                       |
|---------|---------------------------------------|
| numbers | <i>Numbers spelled out in English</i> |
|---------|---------------------------------------|

---

### Description

The numbers 1-20 spelled out in English, for use in reports.

### Format

A vector of character strings

### Details

- numbers - lower case
- Numbers - Capitalized

### Examples

```
numbers[5]
Numbers[5]
```

---

|             |                                                    |
|-------------|----------------------------------------------------|
| objectsizes | <i>Calculate sizes of all objects in workspace</i> |
|-------------|----------------------------------------------------|

---

### Description

Calculate the sizes of all of the objects in one's workspace.

### Usage

```
objectsizes(obj = NULL, sortbysize = TRUE)
```

### Arguments

|            |                                                                   |
|------------|-------------------------------------------------------------------|
| obj        | Vector of object names. If missing, we pull out all object names. |
| sortbysize | If TRUE, sort the objects from smallest to largest.               |

### Details

Calls `utils::object.size()` repeated to get the size of a list of objects.

### Value

A data frame with the only column being the size of each object in megabytes (MB). The row names are the names of the objects.



**See Also**

```
utils::object.size(), base::objects()
```

**Examples**

```
print(output <- objectsizes())  
## Not run: sum(output)
```

---

|          |                    |
|----------|--------------------|
| openfile | <i>Open a file</i> |
|----------|--------------------|

---

**Description**

Open a file using [base::system() and "open" (well, actually "start" on Linux).

**Usage**

```
openfile(file)
```

**Arguments**

|      |                              |
|------|------------------------------|
| file | File name (character string) |
|------|------------------------------|

**Details**

I'd thought that to open a file you'd use open in MacOS and start in Windows, but system("start myfile.pdf") doesn't work in Windows, and rather system("open myfile.pdf") does, so here we're just using open, except on Linux where at least on my system, you can use "start".

**Value**

None.

**Examples**

```
## Not run: openfile("myplot.pdf")
```

---

|                  |                                  |
|------------------|----------------------------------|
| paired.perm.test | <i>Paired permutation t-test</i> |
|------------------|----------------------------------|

---

## Description

Calculates a p-value for a paired t-test via permutations.

## Usage

```
paired.perm.test(d, n.perm = NULL, pval = TRUE)
```

## Arguments

|        |                                                                                                                                          |
|--------|------------------------------------------------------------------------------------------------------------------------------------------|
| d      | A numeric vector (of differences).                                                                                                       |
| n.perm | Number of permutations to perform. If NULL, all possible permutations are considered, and an exact p-value is calculated.                |
| pval   | If TRUE, return just the p-value. If FALSE, return the actual permutation results (with the observed statistic as an attribute, "tobs"). |

## Details

This calls the function `stats::t.test()` to calculate a t-statistic comparing the mean of d to 0. Permutations are performed to give an exact or approximate conditional p-value.

## Value

If pval=TRUE, the output is a single number: the P-value testing for the symmetry about 0 of the distribution of the population from which d was drawn. If pval=FALSE, the output is a vector of the t statistics from the permutations. An attributed "tobs" contains the t statistic with the observed data.

## See Also

`stats::t.test()`, `perm.test()`

## Examples

```
x <- c(43.3, 57.1, 35.0, 50.0, 38.2, 31.2)
y <- c(51.9, 95.1, 90.0, 49.7, 101.5, 74.1)
paired.perm.test(x-y)
```

---

|        |                                 |
|--------|---------------------------------|
| paste. | <i>paste with dot separator</i> |
|--------|---------------------------------|

---

**Description**

Calls `base::paste()` with `sep="."`.

**Usage**

```
paste(...)
```

**Arguments**

...                      Passed to `paste`.

**Details**

There's not much to this function. It is just `base::paste()` with `sep="."`, because I'm lazy.

**Value**

A character string or vector of character strings.

**See Also**

`base::paste()`, `base::paste0()`, `paste00()`, `paste..()`, `paste0.()`, `paste.0()`

**Examples**

```
x <- 3
y <- 4
paste.(x, y)
```

---

|         |                                                              |
|---------|--------------------------------------------------------------|
| paste00 | <i>paste with null or dot as separator and with collapse</i> |
|---------|--------------------------------------------------------------|

---

**Description**

Call `base::paste()` with `sep="."` or `sep=""` and `collapse=""` or `collapse="."`.

**Usage**

```
paste00(...)
```

```
paste..(...)
```

```
paste0.(...)
```

```
paste.0(...)
```

**Arguments**

...                      Passed to paste.

**Details**

There's not much to these functions.

- `paste00(...)` is like `paste(..., sep="", collapse="")`
- `paste..(...)` is like `paste(..., sep=".", collapse=".")`
- `paste0.(...)` is like `paste(..., sep="", collapse=".")`
- `paste.0(...)` is like `paste(..., sep=".", collapse="")`

**Value**

A character string or vector of character strings.

**See Also**

[base::paste\(\)](#), [base::paste0\(\)](#), [paste.\(\)](#)

**Examples**

```
x <- c(3, 4)
y <- c(5, 6)
paste00(x, y)
paste..(x, y)
paste0.(x, y)
paste.0(x, y)
```

---

|           |                           |
|-----------|---------------------------|
| perm.test | <i>Permutation t-test</i> |
|-----------|---------------------------|

---

### Description

Calculates a p-value for a t-test via permutations.

### Usage

```
perm.test(x, y, n.perm = NULL, var.equal = TRUE, pval = TRUE)
```

### Arguments

|           |                                                                                                                                          |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| x         | A numeric vector.                                                                                                                        |
| y         | A second numeric vector.                                                                                                                 |
| n.perm    | Number of permutations to perform. If NULL, all possible permutations are considered, and an exact p-value is calculated.                |
| var.equal | A logical variable indicating whether to treat the two population variances as being equal.                                              |
| pval      | If TRUE, return just the p-value. If FALSE, return the actual permutation results (with the observed statistic as an attribute, "tobs"). |

### Details

This calls the function `stats::t.test()` to calculate a t-statistic comparing the vectors x and y. Permutations are performed to give an exact or approximate conditional p-value.

### Value

If pval=TRUE, the output is a single number: the P-value testing for a difference in the distributions of the populations from which x and y were drawn. If pval=FALSE, the output is a vector of the t statistics from the permutations. An attributed "tobs" contains the t statistic with the observed data.

### See Also

`stats::t.test()`, `paired.perm.test()`

### Examples

```
x <- c(43.3, 57.1, 35.0, 50.0, 38.2, 61.2)
y <- c(51.9, 95.1, 90.0, 49.7, 101.5, 74.1)
perm.test(x,y)
```

---

|                   |                                                                            |
|-------------------|----------------------------------------------------------------------------|
| pick_more_precise | <i>Pick the more precise value for each element in two related vectors</i> |
|-------------------|----------------------------------------------------------------------------|

---

### Description

Align two vectors of numbers by their names and then pick a single value from each, favoring the more precise one. If the two values differ by more than round-off error, treat the value as missing.

### Usage

```
pick_more_precise(x, y, tol = 0.000001)
```

### Arguments

|     |                                              |
|-----|----------------------------------------------|
| x   | A numeric vector                             |
| y   | A second numeric vector                      |
| tol | Tolerance for differences between the values |

### Details

Okay, this is a bit weird. But suppose you have two columns of numbers that have been subjected to different quirky rounding patterns. We align the vectors using their names and then for each element we pick between the two choices, favoring the more-precise one. If one is missing, choose the non-missing value. If the two differ by more than the round-off error, treat it as missing.

### Value

A vector of combined values

---

|              |                                      |
|--------------|--------------------------------------|
| plot_crayons | <i>Illustration of crayon colors</i> |
|--------------|--------------------------------------|

---

### Description

Creates a plot of the crayon colors in [brocolors\(\)](#)

### Usage

```
plot_crayons(
  method2order = c("hsv", "cluster"),
  cex = 0.6,
  mar = rep(0.1, 4),
  bg = "white",
  fg = "black",
  border = FALSE
)
```

**Arguments**

|              |                                                                           |
|--------------|---------------------------------------------------------------------------|
| method2order | method to order colors ("hsv" or "cluster")                               |
| cex          | character expansion for the text                                          |
| mar          | margin paramaters; vector of length 4 (see <code>graphics::par()</code> ) |
| bg           | Background color                                                          |
| fg           | Foreground color (for text and box outlines)                              |
| border       | If TRUE, plot a border around each rectangle                              |

**Value**

None

**References**

[https://en.wikipedia.org/wiki/List\\_of\\_Crayola\\_crayon\\_colors](https://en.wikipedia.org/wiki/List_of_Crayola_crayon_colors)

**See Also**

`brocolors()`

**Examples**

```
plot_crayons()
```

---

qqline2

*qqline for qqplot*


---

**Description**

Adds a line to a quantile-quantile plot for two datasets, from `stats::qqplot()`. (The available `stats::qqline()` function works mainly for `stats::qqnorm()`, with one sample being theoretical quantiles.)

**Usage**

```
qqline2(x, y, probs = c(0.25, 0.75), qtype = 7, ...)
```

**Arguments**

|       |                                                                                                               |
|-------|---------------------------------------------------------------------------------------------------------------|
| x     | The first sample                                                                                              |
| y     | The second sample.                                                                                            |
| probs | numeric vector of length two, representing probabilities. Corresponding quantile pairs define the line drawn. |
| qtype | the type of quantile computation used in <code>stats::quantile()</code> .                                     |
| ...   | graphical parameters.                                                                                         |

**Value**

Intercept and slope of the line.

**See Also**

[stats::qqline\(\)](#), [stats::qqplot\(\)](#)

**Examples**

```
x <- rchisq(500, 3)
y <- rgamma(730, 3, 1/2)
qqplot(x, y)
qqline2(x, y)
```

---

qr2

*The QR decomposition of a matrix*

---

**Description**

Computes the QR decomposition of a matrix.

**Usage**

```
qr2(x, tol = 0.0000001)
```

**Arguments**

|     |                                                                      |
|-----|----------------------------------------------------------------------|
| x   | A matrix whose QR decomposition is to be computed.                   |
| tol | The tolerance for detecting linear dependencies in the columns of x. |

**Details**

Calls the function [base::qr\(\)](#) and returns less compact but more understandable output.

**Value**

A list of two matrices: Q and R.

**See Also**

[base::qr\(\)](#)

**Examples**

```
hilbert <- function(n) { i <- 1:n; 1/outer(i-1,i,"+") }
h5 <- hilbert(5);
qr2(h5)
```



---

quantileSE*Sample quantiles and their standard errors*

---

## Description

Calculate sample quantiles and their estimated standard errors.

## Usage

```
quantileSE(x, p = 0.95, bw = NULL, na.rm = TRUE, names = TRUE)
```

## Arguments

|       |                                                                                          |
|-------|------------------------------------------------------------------------------------------|
| x     | Numeric vector whose sample quantiles are wanted.                                        |
| p     | Numeric vector with values in the interval [0,1]                                         |
| bw    | Bandwidth to use in the density estimation.                                              |
| na.rm | Logical; if true, and NA and NaN's are removed from x before the quantiles are computed. |
| names | Logical; if true, the column names of the result is set to the values in p.              |

## Details

The sample quantiles are calculated with the function `stats::quantile()`. Standard errors are obtained by the asymptotic approximation described in Cox and Hinkley (1974). Density values are estimated using a kernel density estimate with the function `stats::density()`.

## Value

A matrix of size 2 x length(p). The first row contains the estimated quantiles; the second row contains the corresponding estimated standard errors.

## See Also

`stats::quantile()`, `stats::density()`

## Examples

```
quantileSE(rchisq(1000,4), c(0.9,0.95))
```

---

**revgray***Create vector of colors from white to black*

---

**Description**

Calls `grDevices::gray()` then `base::rev()`

**Usage**

```
revgray(n = 256, ...)
```

**Arguments**

|                  |                                            |
|------------------|--------------------------------------------|
| <code>n</code>   | Number of colors.                          |
| <code>...</code> | Passed to <code>grDevices::gray()</code> . |

**Details**

There's not much to this. It's just `gray((n:0)/n)`

**Value**

Vector of colors, from white to black

**See Also**

`grDevices::gray()`

**Examples**

```
x <- matrix(rnorm(100), ncol=10)
image(x, col=revgray())
```

---

**revrainbow***Create vector of colors from blue to red*

---

**Description**

Calls `grDevices::rainbow()` then `base::rev()`

**Usage**

```
revrainbow(n = 256, ...)
```

**Arguments**

`n`                      Number of colors.  
`...`                    Passed to `grDevices::rainbow()`.

**Details**

There's not much to this. It's just `rev(rainbow(start=0, end=2/3, ...))`.

**Value**

Vector of colors, from blue to red.

**See Also**

`base::rev()`, `grDevices::rainbow()`

**Examples**

```
x <- matrix(rnorm(100), ncol=10)
image(x, col=revrainbow())
```

---

rmvn

*Simulate multivariate normal*


---

**Description**

Simulate from a multivariate normal distribution.

**Usage**

```
rmvn(n, mu = 0, V = matrix(1))
```

**Arguments**

`n`                      Number of simulation replicates.  
`mu`                    Mean vector.  
`V`                     Variance-covariance matrix.

**Details**

Uses the Cholesky decomposition of the matrix `V`, obtained by `base::chol()`.

**Value**

A matrix of size `n x length(mu)`. Each row corresponds to a separate replicate.

**See Also**

[stats::rnorm\(\)](#)

**Examples**

```
x <- rmvn(100, c(1,2),matrix(c(1,1,1,4),ncol=2))
```

---

runningmean

*Running mean, sum, or median*

---

**Description**

Calculates a running mean, sum or median with a specified window.

**Usage**

```
runningmean(
  pos,
  value,
  at = NULL,
  window = 1000,
  what = c("mean", "sum", "median", "sd")
)
```

**Arguments**

|        |                                                                                               |
|--------|-----------------------------------------------------------------------------------------------|
| pos    | Positions for the values.                                                                     |
| value  | Values for which the running mean/sum/median/sd is to be applied.                             |
| at     | Positions at which running mean (or sum or median or sd) is calculated. If NULL, pos is used. |
| window | Window width.                                                                                 |
| what   | Statistic to use.                                                                             |

**Value**

A vector with the same length as the input at (or pos, if at is NULL), containing the running statistic.

**Author(s)**

Karl W Broman <broman@wisc.edu>

**See Also**

[runningratio\(\)](#), [runningratio2\(\)](#)

**Examples**

```
x <- 1:10000
y <- rnorm(length(x))
plot(x,y, xaxs="i", yaxs="i")
lines(x, runningmean(x, y, window=100, what="mean"),
      col="blue", lwd=2)
lines(x, runningmean(x, y, window=100, what="median"),
      col="red", lwd=2)
lines(x, runningmean(x, y, window=100, what="sd"),
      col="green", lwd=2)
```

---

|              |                      |
|--------------|----------------------|
| runningratio | <i>Running ratio</i> |
|--------------|----------------------|

---

**Description**

Calculates a running ratio; a ratio  $\text{sum}(\text{top})/\text{sum}(\text{bottom})$  in a sliding window.

**Usage**

```
runningratio(pos, numerator, denominator, at = NULL, window = 1000)
```

**Arguments**

|             |                                                                       |
|-------------|-----------------------------------------------------------------------|
| pos         | Positions for the values.                                             |
| numerator   | Values for numerator in ratio.                                        |
| denominator | Values for denominator in ratio.                                      |
| at          | Positions at which running ratio is calculated. If NULL, pos is used. |
| window      | Window width.                                                         |

**Value**

A vector with the same length as the input at (or pos, if at is NULL), containing the running ratio.

**Author(s)**

Karl W Broman <broman@wisc.edu>

**See Also**

[runningmean\(\)](#), [runningratio2\(\)](#)

**Examples**

```
x <- 1:1000
y <- runif(1000, 1, 5)
z <- runif(1000, 1, 5)
plot(x, runningratio(x, y, z, window=5), type="l", lwd=2)
lines(x, runningratio(x, y, z, window=50), lwd=2, col="blue")
lines(x, runningratio(x, y, z, window=100), lwd=2, col="red")
```

---

|               |                                           |
|---------------|-------------------------------------------|
| runningratio2 | <i>Running ratio with adaptive window</i> |
|---------------|-------------------------------------------|

---

**Description**

Calculates a running ratio; a ratio  $\text{sum}(\text{top})/\text{sum}(\text{bottom})$  in a sliding window, but rather than a fixed-width window, use nearest positions to give some target denominator

**Usage**

```
runningratio2(pos, numerator, denominator, at = NULL, window_denom = 100)
```

**Arguments**

|              |                                                                       |
|--------------|-----------------------------------------------------------------------|
| pos          | Positions for the values.                                             |
| numerator    | Values for numerator in ratio.                                        |
| denominator  | Values for denominator in ratio.                                      |
| at           | Positions at which running ratio is calculated. If NULL, pos is used. |
| window_denom | Target denominator for window for calculating ratio                   |

**Value**

A vector with the same length as the input at (or pos, if at is NULL), containing the running ratio.

**Author(s)**

Karl W Broman <broman@wisc.edu>

**See Also**

[runningmean\(\)](#), [runningratio\(\)](#)

**Examples**

```
x <- 1:1000
y <- runif(1000, 1, 5)
z <- runif(1000, 1, 5)
plot(x, runningratio2(x, y, z, window_denom=10), type="l", lwd=2)
lines(x, runningratio2(x, y, z, window_denom=50), lwd=2, col="blue")
lines(x, runningratio2(x, y, z, window_denom=100), lwd=2, col="red")
```

---

setRNGparallel

---

*Set up random number generation for parallel calculations*


---

**Description**

Set random number generation to L'Ecuyer-CMRG, for use in parallel calculations.

**Usage**

```
setRNGparallel()
```

```
unsetRNGparallel()
```

**Details**

I can never remember the command `RNGkind("L'Ecuyer-CMRG")`; this is a shortcut. `unsetRNG4parallel` sets the random number generator back to the default type.

**Examples**

```
RNGkind()
setRNGparallel()
RNGkind()
unsetRNGparallel()
RNGkind()
```

---

simp

---

*Numerical integration*


---

**Description**

Perform numerical integration by Simpson's rule or the trapezoidal rule.

**Usage**

```
simp(f, a, b, tol = 0.00000001, max.step = 1000, ...)
```

**Arguments**

|                       |                                                           |
|-----------------------|-----------------------------------------------------------|
| <code>f</code>        | The integrand; must be a vectorized function.             |
| <code>a</code>        | Lower limit of integration.                               |
| <code>b</code>        | Upper limit of integration.                               |
| <code>tol</code>      | Tolerance for choosing the number of grid points.         |
| <code>max.step</code> | Log base 2 of the total number of grid points.            |
| <code>...</code>      | Other arguments passed to the integrand, <code>f</code> . |

**Details**

Iterately doubles the number of grid points for the numerical integral, stopping when the integral decreases by less than `tol`.

**Value**

The integral of `f` from `a` to `b`.

**See Also**

`stats::integrate()`

**Examples**

```
f <- function(x) x*x*(1-x)*sin(x*x)
I1 <- trap(f,0,2)
I2 <- simp(f,0,2)
```

---

spell\_out

*Spell out an integer*


---

**Description**

Spell out an integer as a word, for use in reports/papers.

**Usage**

```
spell_out(number, capitalize = FALSE, max_value = 9)
```

**Arguments**

|                         |                                                                        |
|-------------------------|------------------------------------------------------------------------|
| <code>number</code>     | A number that is to be spelled out (can be a vector).                  |
| <code>capitalize</code> | If TRUE, capitalize the first letter.                                  |
| <code>max_value</code>  | Maximum value to use (generally 9); if larger than this, use numerals. |



**Value**

Character string (or vector of character strings) with numbers spelled out, or as numerals if large.

**Examples**

```
spell_out(9)
spell_out(9, cap=TRUE)
spell_out(9, max_value=5)
```

---

|                |                                                                 |
|----------------|-----------------------------------------------------------------|
| strwidth2lines | <i>Calculate width of a character string in number of lines</i> |
|----------------|-----------------------------------------------------------------|

---

**Description**

Convert stringwidth units to number of (margin) lines

**Usage**

```
strwidth2lines(s, ...)
```

**Arguments**

|     |                                                                   |
|-----|-------------------------------------------------------------------|
| s   | A character or expression vector whose length is to be calculated |
| ... | additional information used by strwidth, such as cex              |

**Value**

Maximum string width in units of margin lines

**Author(s)**

Aimee Teo Broman

**Examples**

```
p <- par(no.readonly = TRUE)
string <- sapply(sample(1:20,15,replace=TRUE),
  function(a) paste(LETTERS[1:a], collapse=""))
nlines <- strwidth2lines(string)
mar <- par("mar")
par(mar=c(mar[1],nlines+0.1,mar[3:4]))
plot(1:length(string),1:length(string),yaxt="n", ylab="")
axis(side=2, at=seq_along(string), lab=string, las=1)
par(p)
nlines <- strwidth2lines(string,cex=1.5)
par(mar=c(mar[1:3],nlines+0.1))
plot(1:length(string),1:length(string),ylab="")
mgp <- par("mgp")
axis(side = 4, at=seq_along(string),
```

```

labels = string ,las=1, hadj=1,
      mgp=c(mgp[1],nlines,mgp[3]),cex.axis=1.5)
par(p)

```

---

strwidth2xlim

---

*Calculate horizontal limit in user coordinates for adding labels*


---

## Description

Calculates the x-axis limits when adding (long) labels to a plot

## Usage

```
strwidth2xlim(x, xstring, pos = 4, offset = 0.5, ...)
```

## Arguments

|         |                                                                                                                                                           |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| x       | numeric vector of horizontal coordinates                                                                                                                  |
| xstring | character vector, specifying text to be written                                                                                                           |
| pos     | position specifier for text; values of 1, 2, 3, and 4, respectively, indicate positions below, to the left of, above, and to the right of the coordinates |
| offset  | offset of the label from the coordinate in fractions of a character width                                                                                 |
| ...     | additional text parameters from par, such as cex                                                                                                          |

## Details

See text for details on pos and offset.

## Value

Minimum and maximum x-axis limits for adding horizontal text

## Author(s)

Aimee Teo Broman

## See Also

[graphics::text\(\)](#)

**Examples**

```
x <- runif(15,-1,1)*10
xlabs <- sapply(sample(1:20,15,replace=TRUE),
  function(a) paste(LETTERS[1:a], collapse=""))
## Labels to the left ##
xlims <- strwidth2xlim(x,xlabs,pos=2)
plot(x,1:length(x),xlim=xlims)
text(x,1:length(x),xlabs,pos=2)
## Labels to the right ##
xlims <- strwidth2xlim(x,xlabs,pos=4,cex=0.7)
plot(x,1:length(x),xlim=xlims)
text(x,1:length(x),xlabs,pos=4,cex=0.7)
```

---

|         |                                     |
|---------|-------------------------------------|
| switchv | <i>Vectorized version of switch</i> |
|---------|-------------------------------------|

---

**Description**

Vectorized version of `base::switch()`: just loops over input and calls `base::switch()`.

**Usage**

```
switchv(EXPR, ...)
```

**Arguments**

|      |                                                            |
|------|------------------------------------------------------------|
| EXPR | An expression evaluating to a vector of numbers or strings |
| ...  | List of alternatives                                       |

**Value**

Vector of returned values.

**Examples**

```
switchv(c("horse", "fish", "cat", "bug"),
  horse="fast",
  cat="cute",
  "what?")
```

---

|            |                             |
|------------|-----------------------------|
| theme_karl | <i>Karl's ggplot2 theme</i> |
|------------|-----------------------------|

---

**Description**

Karl's ggplot2 theme: black border and no ticks

**Usage**

```
theme_karl(base_size = 12, base_family = "", ...)
```

```
karl_theme(base_size = 12, base_family = "", ...)
```

**Arguments**

|             |                                         |
|-------------|-----------------------------------------|
| base_size   | Base font size                          |
| base_family | Base font family                        |
| ...         | Passed to <code>ggplot2::theme()</code> |

**Value**

An object as returned by `ggplot2::theme()`

**See Also**

`ggplot2::theme()`

**Examples**

```
library(ggplot2)
mtcars$cyl <- factor(mtcars$cyl)
ggplot(mtcars, aes(y=mpg, x=disp, color=cyl)) +
  geom_point() + theme_karl()
```

---

|          |                                                  |
|----------|--------------------------------------------------|
| timeplot | <i>Scatterplot with date/times on the x-axis</i> |
|----------|--------------------------------------------------|

---

**Description**

Like the `grayplot()` function, but with the x-axis having date/times

**Usage**

```
timeplot(x, y, ..., n = 5, scale = NULL, format = NULL)
```

Arguments

|        |                                                                               |
|--------|-------------------------------------------------------------------------------|
| x      | X-axis coordinates of points for the plot (must be date/time values)          |
| y      | Y-axis coordinates of points for the plot                                     |
| ...    | Optional graphics arguments passed to <code>grayplot()</code>                 |
| n      | Approximate number of x-axis labels (passed to <code>base::pretty()</code> ). |
| scale  | Passed to <code>time_axis()</code> for defining the x-axis labels             |
| format | Passed to <code>time_axis()</code> for defining the x-axis labels             |

Value

None.

See Also

`time_axis()`, `grayplot()`, `dotplot()`

Examples

```
n <- 100
y <- rnorm(n)
x <- seq(as.POSIXct("2024-05-01 11:23"), as.POSIXct("2024-05-01 14:50"), length.out=n)
timeplot(x, y)
```

---

|           |                                 |
|-----------|---------------------------------|
| time_axis | <i>Set up a time-based axis</i> |
|-----------|---------------------------------|

---

Description

Set up a time-based axis for base graphics

Usage

```
time_axis(times, n = 8, scale = NULL, format = NULL)
```

Arguments

|        |                                                                                                                    |
|--------|--------------------------------------------------------------------------------------------------------------------|
| times  | A vector of date/times that will be plotted                                                                        |
| n      | Number of values to use in axis                                                                                    |
| scale  | Forced choice of scale for axis labels: "sec", "min", "hr", or "day". If NULL, scale is chosen based on the times. |
| format | If provided, used in place of scale for formatting the times.                                                      |

Value

A data frame with the numeric values to plot plus labels to use.

**See Also**[timeplot\(\)](#)**Examples**

```

n <- 100
y <- rnorm(n)

# labels as days
x <- seq(as.POSIXct("2024-05-01 11:23"), as.POSIXct("2024-05-07 14:50"), length.out=n)
xax <- time_axis(x)
grayplot(x, y, xat=NA, vlines=xax$x)
axis(side=1, at=xax$x, labels=xax$label, mgp=c(2.1, 0.5, 0), tick=FALSE)

# labels as HH:MM
x <- seq(as.POSIXct("2024-05-01 11:23"), as.POSIXct("2024-05-01 14:50"), length.out=n)
xax <- time_axis(x)
grayplot(x, y, xat=NA, vlines=xax$x)
axis(side=1, at=xax$x, labels=xax$label, mgp=c(2.1, 0.5, 0), tick=FALSE)

# labels as seconds
x <- seq(as.POSIXct("2024-05-01 11:23:05.3"), as.POSIXct("2024-05-01 11:23:55.7"), length.out=n)
xax <- time_axis(x)
grayplot(x, y, xat=NA, vlines=xax$x)
axis(side=1, at=xax$x, labels=xax$label, mgp=c(2.1, 0.5, 0), tick=FALSE)

# custom time format
xax <- time_axis(x, format="%H:%M:%S")
grayplot(x, y, xat=NA, vlines=xax$x)
axis(side=1, at=xax$x, labels=xax$label, mgp=c(2.1, 0.5, 0), tick=FALSE)

```

---

triarrow

---

*Plot an arrow within a Holmans triangle*


---

**Description**

Plot an arrow within a Holmans triangle (an equilateral triangle used to depict trinomial distributions).

**Usage**

```
triarrow(x, ...)
```

**Arguments**

|                  |                                                                                                                                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <code>x</code>   | A matrix with three rows and two columns, each column being a trinomial distribution. An arrow between the two points is plotted. |
| <code>...</code> | Passed to <a href="#">graphics::arrows()</a> .                                                                                    |

## Details

Plot of an equilateral triangle, in order to depict trinomial distributions. A trinomial distribution (that is, a trio of non-negative numbers that add to 1) is equated to a point in the triangle through the distances to the three sides. This makes use of the fact that for any point in an equilateral triangle, the sum of the distances to the three sides is constant. First use `triplot()` to first plot the equilateral triangle.

## Value

The (x,y) coordinates of the endpoints of the arrows plotted.

## See Also

`triplot()`, `tripoints()`, `trilines()`, `tritext()`

## Examples

```
triplot()
x <- cbind(c(0.9, 0.05, 0.05), c(0.8, 0.1, 0.1), c(0.1, 0.9, 0), c(0, 0.9, 0.1))
tripoints(x, lwd=2, col=c("black","blue","red","green"), pch=16)
trilines(x, lwd=2, col="orange")
y <- cbind(c(0.05, 0.05, 0.9), c(0.25, 0.25, 0.5))
triarrow(y, col="blue", lwd=2, len=0.1)
```

---

trigrd

---

*Add grid lines to triplot*


---

## Description

Add grid lines to a ternary plot with `triplot()`

## Usage

```
trigrd(
  n = 1,
  col = "white",
  lty = 1,
  lwd = 1,
  outer_col = "black",
  outer_lwd = 2,
  ...
)
```

**Arguments**

|           |                                                        |
|-----------|--------------------------------------------------------|
| n         | Number of grid lines                                   |
| col       | Color of grid lines                                    |
| lty       | Line type for grid lines                               |
| lwd       | Line width of grid lines                               |
| outer_col | Color of outer triangle (If NULL, not plotted)         |
| outer_lwd | Line width of outer triangle                           |
| ...       | Additional arguments passed to <code>trilines()</code> |

**See Also**

`triplot()`, `trilines()`

**Examples**

```
triplot(c("A", "H", "B"), gridlines=1, grid_lwd=2)
trigrd(3, lty=2, lwd=2)
```

---

trilines

---

*Plot lines within a Holmans triangle*


---

**Description**

Plot lines within a Holmans triangle (an equilateral triangle used to depict trinomial distributions).

**Usage**

```
trilines(x, ...)
```

**Arguments**

|     |                                                                                                               |
|-----|---------------------------------------------------------------------------------------------------------------|
| x   | A matrix with three rows, each column being a trinomial distribution. Lines between these points are plotted. |
| ... | Passed to <code>graphics::lines()</code> .                                                                    |

**Details**

Plot of an equilateral triangle, in order to depict trinomial distributions. A trinomial distribution (that is, a trio of non-negative numbers that add to 1) is equated to a point in the triangle through the distances to the three sides. This makes use of the fact that for any point in an equilateral triangle, the sum of the distances to the three sides is constant. First use `triplot()` to first plot the equilateral triangle.

**Value**

The (x,y) coordinates of the endpoints of the lines plotted.



See Also

```
triplot(), tripoints(), triarrow(), tritext()
```

Examples

```
triplot()
x <- cbind(c(0.9, 0.05, 0.05), c(0.8, 0.1, 0.1), c(0.1, 0.9, 0), c(0, 0.9, 0.1))
tripoints(x, lwd=2, col=c("black","blue","red","green"), pch=16)
trilines(x, lwd=2, col="orange")
y <- cbind(c(0.05, 0.05, 0.9), c(0.25, 0.25, 0.5))
triarrow(y, col="blue", lwd=2, len=0.1)
```

---

|         |                              |
|---------|------------------------------|
| triplot | <i>Plot Holmans triangle</i> |
|---------|------------------------------|

---

Description

Plot Holmans triangle (an equilateral triangle used to depict trinomial distributions).

Usage

```
triplot(
  labels = c("(1,0,0)", "(0,1,0)", "(0,0,1)"),
  col = "black",
  lwd = 2,
  bgcolor = "gray90",
  gridlines = 0,
  grid_col = "white",
  grid_lty = 1,
  grid_lwd = 1,
  ...
)
```

Arguments

|           |                                                              |
|-----------|--------------------------------------------------------------|
| labels    | Labels for the three corners (lower-right, top, lower-left). |
| col       | Color of edges of triangle                                   |
| lwd       | Line width for edges of triangle                             |
| bgcolor   | Background color for triangle                                |
| gridlines | Number of grid lines (if 0, no grid lines will be plotted)   |
| grid_col  | Color of grid lines                                          |
| grid_lty  | Line type of grid lines                                      |
| grid_lwd  | Line width of grid lines                                     |
| ...       | Passed to plot().                                            |

### Details

Plot of an equilateral triangle, in order to depict trinomial distributions. A trinomial distribution (that is, a trio of non-negative numbers that add to 1) is equated to a point in the triangle through the distances to the three sides. This makes use of the fact that for any point in an equilateral triangle, the sum of the distances to the three sides is constant. The `tripplot` function creates an empty triangle for use with the related functions `tripoints()`, `trilines()`, `triarrow()`.

### Value

The (x,y) coordinates of the points plotted, if any.

### See Also

`tripoints()`, `trilines()`, `triarrow()`, `tritext()`

### Examples

```
tripplot()
x <- cbind(c(0.9, 0.05, 0.05), c(0.8, 0.1, 0.1), c(0.1, 0.9, 0), c(0, 0.9, 0.1))
tripoints(x, lwd=2, col=c("black", "blue", "red", "green"), pch=16)
trilines(x, lwd=2, col="orange")
y <- cbind(c(0.05, 0.05, 0.9), c(0.25, 0.25, 0.5))
triarrow(y, col="blue", lwd=2, len=0.1)
```

---

tripoints

*Plot points within a Holmans triangle*

---

### Description

Plot points within a Holmans triangle (an equilateral triangle used to depict trinomial distributions).

### Usage

```
tripoints(x, ...)
```

### Arguments

`x`                      A matrix with three rows, each column being a trinomial distribution.  
`...`                    Passed to `graphics::points()`.

### Details

Plot of an equilateral triangle, in order to depict trinomial distributions. A trinomial distribution (that is, a trio of non-negative numbers that add to 1) is equated to a point in the triangle through the distances to the three sides. This makes use of the fact that for any point in an equilateral triangle, the sum of the distances to the three sides is constant. First use `tripplot()` to first plot the equilateral triangle.

**Value**

The (x,y) coordinates of the points plotted.

**See Also**

[triplot\(\)](#), [trilines\(\)](#), [triarrow\(\)](#), [tritrtext\(\)](#)

**Examples**

```
triplot()
x <- cbind(c(0.9, 0.05, 0.05), c(0.8, 0.1, 0.1), c(0.1, 0.9, 0), c(0, 0.9, 0.1))
tripoints(x, lwd=2, col=c("black", "blue", "red", "green"), pch=16)
trilines(x, lwd=2, col="orange")
y <- cbind(c(0.05, 0.05, 0.9), c(0.25, 0.25, 0.5))
triarrow(y, col="blue", lwd=2, len=0.1)
```

---

tritrtext

---

*Plot text within a Holmans triangle*


---

**Description**

Plot text within a Holmans triangle (an equilateral triangle used to depict trinomial distributions).

**Usage**

```
tritrtext(x, labels, ...)
```

**Arguments**

|        |                                                                                 |
|--------|---------------------------------------------------------------------------------|
| x      | A matrix with three rows, each column being a trinomial distribution.           |
| labels | A vector of character strings, with length equal to the number of columns of x. |
| ...    | Passed to <a href="#">graphics::text()</a> .                                    |

**Details**

Plot of an equilateral triangle, in order to depict trinomial distributions. A trinomial distribution (that is, a trio of non-negative numbers that add to 1) is equated to a point in the triangle through the distances to the three sides. This makes use of the fact that for any point in an equilateral triangle, the sum of the distances to the three sides is constant. First use [triplot\(\)](#) to first plot the equilateral triangle.

**Value**

Text is plotted at the (x,y) coordinates of the points.

**See Also**

[triplot\(\)](#), [trilines\(\)](#), [triarrow\(\)](#), [tripoints\(\)](#)

**Examples**

```

triplot()
x <- cbind(c(0.25, 0.5, 0.25), c(1/3, 1/3, 1/3))
tripoints(x, lwd=2, pch=21, bg="lightblue")
xp <- x + c(0.02, 0, -0.02)
tritext(xp, c("(1/4,1/2,1/4)", "(1/3,1/3,1/3)"), adj=c(0, 0.5))

```

---

twocolorpal

---

*Create vector of colors from blue to white to red*


---

**Description**

Create a two-color palette from one color to another through some third color

**Usage**

```
twocolorpal(colors = c("slateblue", "white", "violetred"), n = 256, ...)
```

**Arguments**

|        |                                                           |
|--------|-----------------------------------------------------------|
| colors | Vector of three colors                                    |
| n      | Number of colors in output.                               |
| ...    | Passed to <a href="#">grDevices::colorRampPalette()</a> . |

**Value**

Vector of colors, from blue to white to red

**See Also**

[revgray\(\)](#)

**Examples**

```

x <- matrix(rnorm(100, 0.5), ncol=10)
mxabs <- max(abs(x))
image(x, col=twocolorpal(), zlim=c(-mxabs, mxabs))

```

---

|            |                                                     |
|------------|-----------------------------------------------------|
| vec2string | <i>Turn a vector into a single character string</i> |
|------------|-----------------------------------------------------|

---

**Description**

Turn a vector into a single character string with the items separated by commas and an "and".

**Usage**

```
vec2string(x, conjunction = "and")
```

**Arguments**

|             |                                  |
|-------------|----------------------------------|
| x           | A vector                         |
| conjunction | Word used to combine the strings |

**Examples**

```
vec2string(letters[1:2])  
vec2string(letters[1:4])  
vec2string(letters[1:4], "or")
```

---

|      |                                   |
|------|-----------------------------------|
| venn | <i>Plot to-scale Venn diagram</i> |
|------|-----------------------------------|

---

**Description**

Plot a Venn diagram (with two groups), to scale, either with circles or with squares.

**Usage**

```
venn(  
  setA = 50,  
  setB = 50,  
  both = 25,  
  method = c("circle", "square"),  
  labels = c("A", "B"),  
  col = c("blue", "red")  
)
```

**Arguments**

|        |                                                |
|--------|------------------------------------------------|
| setA   | Total area of set A.                           |
| setB   | Total area of set B.                           |
| both   | Area of intersection of sets A and B.          |
| method | Indicates whether to plot circles or squares.  |
| labels | Labels for the two sets. (NULL for no labels.) |
| col    | Colors of the two sets.                        |

**Details**

Plots a to-scale Venn diagram with two sets, so that the relative areas of the two sets and their intersection are exact.

**Value**

None.

**Examples**

```
venn(setA=86, setB=1622, both=10)
venn(setA=86, setB=1622, both=10, method="square")
```

---

|           |                           |
|-----------|---------------------------|
| winsorize | <i>Winsorize a vector</i> |
|-----------|---------------------------|

---

**Description**

For a numeric vector, move values below and above the q and 1-q quantiles to those quantiles.

**Usage**

```
winsorize(x, q = 0.006)
```

**Arguments**

|   |                       |
|---|-----------------------|
| x | Numeric vector        |
| q | Lower quantile to use |

**Value**

A vector like the input x, but with extreme values moved in to the q and 1-q quantiles.

**Examples**

```
x <- sample(c(1:10, rep(NA, 10), 21:30))
winsorize(x, 0.2)
```

---

|           |                                                                         |
|-----------|-------------------------------------------------------------------------|
| xlimlabel | <i>Calculate horizontal limit in user coordinates for adding labels</i> |
|-----------|-------------------------------------------------------------------------|

---

**Description**

Calculates the x-axis limits when adding (long) labels to a plot

**Usage**

```
xlimlabel(x, xlabels, pos = 4, offset = 0.5, ...)
```

**Arguments**

|         |                                                                                                                                                           |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| x       | numeric vector of horizontal coordinates                                                                                                                  |
| xlabels | character vector, specifying text to be written                                                                                                           |
| pos     | position specifier for text; values of 1, 2, 3, and 4, respectively, indicate positions below, to the left of, above, and to the right of the coordinates |
| offset  | offset of the label from the coordinate in fractions of a character width                                                                                 |
| ...     | Additional par arguments                                                                                                                                  |

**Details**

See [graphics::text\(\)](#) for details on pos and offset.

**Value**

Minimum and maximum x-axis limits for adding horizontal text

**Author(s)**

Aimee Teo Broman

**See Also**

[graphics::text\(\)](#)

**Examples**

```
x <- runif(15, -1, 1)*10
xlabels <- sapply(sample(1:20, 15, replace=TRUE),
  function(a) paste(LETTERS[1:a], collapse=""))
par(mfrow=c(2,1), las=1)
## Labels to the left ##
xlims <- xlimlabel(x, xlabels, pos=2)
plot(x, 1:length(x), xlim=xlims, ylab="Index")
text(x, 1:length(x), xlabels, pos=2)
## Labels to the right ##
xlims <- xlimlabel(x, xlabels, pos=4, cex=0.7)
```

```
plot(x, 1:length(x), xlim=xlims, ylab="Index")
text(x, 1:length(x), xlabs, pos=4, cex=0.7)
```

---

|       |                       |
|-------|-----------------------|
| %nin% | <i>Value matching</i> |
|-------|-----------------------|

---

**Description**

%in% returns logical vector indicating values that do not have a match. %win% returns a vector of the values that have a match. %wnin% returns a vector of the values that do not have a match.

**Usage**

```
x %nin% table

x %win% table

x %wnin% table
```

**Arguments**

|       |                                         |
|-------|-----------------------------------------|
| x     | Vector of values to be matched.         |
| table | Vector of values to be matched against. |

**Value**

%nin% returns a logical vector of the same length of x, indicating which values are not in table.  
%win% returns a sub-vector of x with the values that were found in table.  
%wnin% returns a sub-vector of x with the values that were not found in table.

**See Also**

```
base::match\(\)
```

**Examples**

```
vals <- c("a", "xa", "b")
vals %nin% letters
vals %win% letters
vals %wnin% letters
```



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