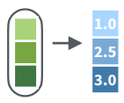
# Apply functions with purrr : : **CHEAT SHEET**

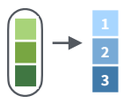
## Map Functions

### ONE LIST

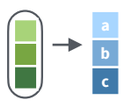
**map(**.x, .f, …**)** Apply a function to each element of a list or vector, return a list.
x <- list(1:10, 11:20, 21:30)
l1 <- list(x = c("a", "b"), y = c("c", "d"))
map(l1, sort, decreasing = TRUE)


**map_dbl(**.x, .f, …**)**
Return a double vector.
map_dbl(x, mean)



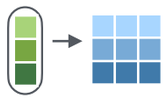

**map_int(**.x, .f, ...**)**
Return an integer vector.
map_int(x, length)




**map_chr(**.x, .f, …**)**
Return a character vector.
map_chr(l1, paste, collapse = "")


**map_lgl(**.x, .f, …**)**
Return a logical vector.
map_lgl(x, is.integer)

**map_dfc(**.x, .f, ...**)**
Return a data frame created by column-binding.
map_dfc(l1, rep, 3)



**map_dfr(**.x, .f, ..., .id = NULL**)**
Return a data frame created by row-binding.
map_dfr(x, summary)

**walk(**.x, .f, ...**)** Trigger side effects, return invisibly.
walk(x, print)

### TWO LISTS

**map2(**.x, .y, .f, …**)** Apply a function to pairs of elements from two lists or vectors, return a list.
y <- list(1, 2, 3); z <- list(4, 5, 6); l2 <- list(x = "a", y = "z")
map2(x, y, ~ .x * .y)



**map2_dbl(**.x, .y, .f, …**)**
Return a double vector.
map2_dbl(y, z, ~ .x / .y)


**map2_int(**.x, .y, .f, …**)**
Return an integer vector.
map2_int(y, z, `+`)


**map2_chr(**.x, .y, .f, …**)**
Return a character vector.
map2_chr(l1, l2, paste, collapse = ",", sep = ":")


**map2_lgl(**.x, .y, .f, …**)**
Return a logical vector.
map2_lgl(l2, l1, `%in%`)

**map2_dfc(**.x, .y, .f, ...**)**
Return a data frame created by column-binding.
map2_dfc(l1, l2,
~ as.data.frame(c(.x, .y)))

**map2_dfr(**.x, .y, .f, ..., .id = NULL**)** Return a data frame created by row-binding.
map2_dfr(l1, l2,
~ as.data.frame(c(.x, .y)))

**walk2(**.x, .y, .f, ...**)** Trigger side effects, return invisibly.
walk2(objs, paths, save)

### MANY LISTS

**pmap(**.l, .f, …**)** Apply a function to groups of elements from a list of lists or vectors, return a list.
pmap(list(x, y, z), ~ ..1 * (..2 + ..3))



**pmap_dbl(**.l, .f, …**)**
Return a double vector.
pmap_dbl(list(y, z), ~ .x / .y)


**pmap_int(**.l, .f, …**)**
Return an integer vector.
pmap_int(list(y, z), `+`)


**pmap_chr(**.l, .f, …**)**
Return a character vector.
pmap_chr(list(l1, l2), paste, collapse = ",", sep = ":")


**pmap_lgl(**.l, .f, …**)**
Return a logical vector.
pmap_lgl(list(l2, l1), `%in%`)

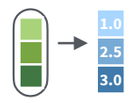
**pmap_dfc(**.l, .f, ...**)** Return a data frame created by column-binding.
pmap_dfc(list(l1, l2),
~ as.data.frame(c(.x, .y)))

**pmap_dfr(**.l, .f, ..., .id = NULL**)** Return a data frame created by row-binding.
pmap_dfr(list(l1, l2),
~ as.data.frame(c(.x, .y)))

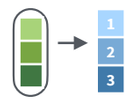
**pwalk(**.l, .f, ...**)** Trigger side effects, return invisibly.
pwalk(list(objs, paths), save)

### LISTS AND INDEXES

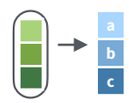
**imap(**.x, .f, ...**)** Apply .f to each element and its index, return a list.
imap(y, ~ paste0(.y, ": ", .x))


**imap_dbl(**.x, .f, …**)**
Return a double vector.
imap_dbl(y, ~ .y)

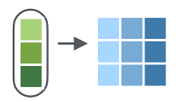



**imap_int(**.x, .f, ...**)**
Return an integer vector.
imap_int(y, ~ .y)




**imap_chr(**.x, .f, …**)**
Return a character vector.
imap_chr(y, ~ paste0(.y, ": ", .x))


**imap_lgl(**.x, .f, …**)**
Return a logical vector.
imap_lgl(l1, ~ is.character(.y))



**imap_dfc(**.x, .f, ...**)**
Return a data frame created by column-binding.
imap_dfc(l2,
~ as.data.frame(c(.x, .y)))

**imap_dfr(**.x, .f, ..., .id = NULL**)**
Return a data frame created by row-binding.
imap_dfr(l2,
~ as.data.frame(c(.x, .y)))

**iwalk(**.x, .f, ...**)** Trigger side effects, return invisibly.
iwalk(z, ~ print(paste0(.y, ": ", .x)))

## Function Shortcuts

Use **~ .** with functions like **map()** that have single arguments.

**map(l, ~ . + 2)**
becomes
**map(l, function(x) x + 2 ))**

Use **~ .x .y** with functions like **map2()** that have two arguments.

**map2(l, p, ~ .x +.y)**
becomes
**map2(l, p, function(l, p) l + p)**

Use **~ ..1 ..2 ..3** etc with functions like **pmap()** that have many arguments.

**pmap(list(a, b, c), ~ ..3 + ..1 - ..2)**
becomes
**pmap(list(a, b, c), function(a, b, c) c + a -b)**

Use **~ .x .y** with functions like **imap()**. .x will get the list value and .y will get the index.

**imap(list(a, b, c), ~ paste0(.y, ": ", .x)**
outputs **"index: value"** for each item

Use a **string** or an **integer** with any map function to index list elements by name or position. **map(l, "name")** becomes **map(l, function(x) x[["name"]])**

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# Work with Lists

## Filter

**keep(**.x, .p, …**)**
Select elements that pass a logical test.
Conversely, **discard()**.
keep(x, is.na)

**compact(**.x, .p = identity**)**
Drop empty elements.
compact(x)

**head_while(**.x, .p, …**)**
Return head elements until one does not pass.
Also **tail_while()**.
head_while(x, is.character)

**detect(**.x, .f, ..., dir = c("forward", "backward"), .right = NULL, .default = NULL**)**
Find first element to pass.
detect(x, is.character)

**detect_index(**.x, .f, ..., dir = c("forward", "backward"), .right = NULL**)** Find index of first element to pass.
detect_index(x, is.character)

**every(**.x, .p, …**)**
Do all elements pass a test?
every(x, is.character)

**some(**.x, .p, …**)**
Do some elements pass a test?
some(x, is.character)

**none(**.x, .p, …**)**
Do no elements pass a test?
none(x, is.character)

**has_element(**.x, .y**)**
Does a list contain an element?
has_element(x, "foo")

**vec_depth(**x**)**
Return depth (number of levels of indexes).
vec_depth(x)

## Index

**pluck(**.x, ..., .default=NULL**)**
Select an element by name or index. Also **attr_getter()** and **chuck()**.
pluck(x, "b")
x %>% pluck("b")

**assign_in(**x, where, value**)**
Assign a value to a location using pluck selection.
assign_in(x, "b", 5)
x %>% assign_in("b", 5)

**modify_in(**.x, .where, .f**)**
Apply a function to a value at a selected location.
modify_in(x, "b", abs)
x %>% modify_in("b", abs)

## Reshape

**flatten(**.x**)** Remove a level of indexes from a list.
Also **flatten_chr()** etc.
flatten(x)

**array_tree(**array, margin = NULL**)** Turn array into list.
Also **array_branch()**.
array_tree(x, margin = 3)

**cross2(**.x, .y, .filter = NULL**)**
All combinations of .x and .y.
Also **cross()**, **cross3()**, and **cross_df()**.
cross2(1:3, 4:6)

**transpose(**.l, .names = NULL**)**
Transposes the index order in a multi-level list.
transpose(x)

**set_names(**x, nm = x**)**
Set the names of a vector/list directly or with a function.
set_names(x, c("p", "q", "r"))
set_names(x, tolower)

## Modify

**modify(**.x, .f, ...**)** Apply a function to each element. Also **modify2()**, and **imodify()**.
modify(x, ~.+ 2)

**modify_at(**.x, .at, .f, ...**)** Apply a function to selected elements.
Also **map_at()**.
modify_at(x, "b", ~.+ 2)

**modify_if(**.x, .p, .f, ...**)** Apply a function to elements that pass a test. Also **map_if()**.
modify_if(x, is.numeric,~.+2)

**modify_depth(**.x, .depth, .f, ...**)**
Apply function to each element at a given level of a list. Also **map_depth()**.
modify_depth(x, 2, ~.+ 2)

## Combine

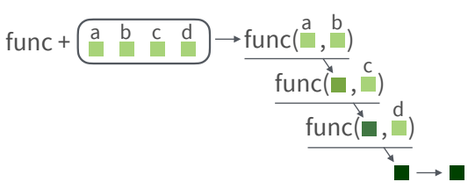
**append(**x, values, after = length(x)**)** Add values to end of list.
append(x, list(d = 1))

**prepend(**x, values, before = 1**)**
Add values to start of list.
prepend(x, list(d = 1))

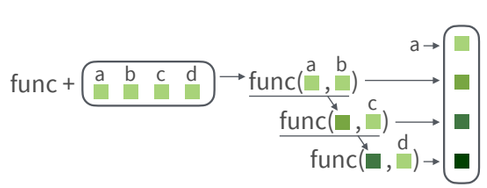
**splice(**…**)** Combine objects into a list, storing S3 objects as sub-lists.
splice(x, y, "foo")

## Reduce

**reduce(**.x, .f, ..., .init, .dir = c("forward", "backward")**)** Apply function recursively to each element of a list or vector. Also **reduce2()**.
reduce(x, sum)




**accumulate(**.x, .f, ..., .init**)** Reduce a list, but also return intermediate results. Also **accumulate2()**.
accumulate(x, sum)




# List-Columns

| max | seq |
|---|---|
| 3 | <int [3]> |
| 4 | <int [4]> |
| 5 | <int [5]> |

**List-columns** are columns of a data frame where each element is a list or vector instead of an atomic value. Columns can also be lists of data frames. See **tidyr** for more about nested data and list columns.

### WORK WITH LIST-COLUMNS

Manipulate list-columns like any other kind of column, using **dplyr** functions like **mutate()** and **transmute()**. Because each element is a list, use **map functions** within a column function to manipulate each element.

**map()**, **map2()**, or **pmap()** return lists and will **create new list-columns**.

```
starwars %>%
  transmute(ships = map2(vehicles,
                         starships,
                         append)
```

list function, return list
list-columns
column function

Suffixed map functions like **map_int()** return an atomic data type and will **simplify list-columns into regular columns**.

```
starwars %>%
  mutate(n_films = map_int(films, length))
```

list function, return int
column function
list-column