

Dataframe 1

```
data.frame(data, row.names =
NULL,...)
data.frame(name1 = vector1,
name2 = vector2,...)
> vec1<-c( 25, 24, 21, 23, 22)
> vec2<-c("M", "F", "F", "M", "F")
> vec3<-
c("A1", "A2", "A3", "A1", "A2")
> (df1 <- data.frame(age=vec1,
sex=vec2, group=vec3))
  age sex group
1 25 M A1
2 24 F A2
3 21 F A3
4 23 M A1
5 22 F A2
```

(**Basics)

Dataframe 2

```
is.object(df1)      TRUE
typeof(df1)         "list"
class(df1)           "data.frame"
sloop::otype(df1)   "S3"

df1[c(1,2)]         Subsetting
df1[[2]]
df1[["sex"]]
df1$sex
```

(**Basics)

Dataframe 3

Important functionality:

```
str(df1)
attributes(df1)
merge()
merge by common columns or row names
cbind() rbind()
head()
visualize the first rows of a df
attach()
df can be attached
summary()
basic statistics
```

(**Basics)

Dataframe 4

Dataframes can contain lists:

```
1) df <- data.frame(x=1:3); df$y <- list(1:2, 3:4)
2) df <- data.frame(x = 1:3, y = I(list(1:2, 1:3, 1:4)))
```

Can be also matrices:

```
dfm <- data.frame(x = 1:3 * 10)
dfm$y <- matrix(1:9, nrow = 3)
dfm$z <- data.frame(a = 3:1, b = letters[1:3])
```

(**Adanced)

Tibbles 1

Part of the tidyverse
More flexible than datasets:
`(tib0<-tibble(x = 1:3, y = 1, z = name = letters[1:3], lis = list(1:3))`
Can be more rigid: recycling
`(tib2 <- tibble::tibble(age=1, sex = letters[1:3]))`

(**Basics)

Tibbles 2

```
attributes(tib0)    $names,
                    $row.names,
                    $class
mode(tib0)          "list"
typeof(tib0)         "list"
class(tib0)          "tbl_df"
typeof(tib0)         "S3"
is_tibble()          Test if tibble
as.data.frame()       Convert to df
tibble()             Table format
```

(**Basics)



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Control flow

```
if() statements
> if(x > 10) {y<-x ; print(y)}
+ else {y<-x+1 ; print(y)}

switch() tests an expression against elements of a list.
switch(x, "red", "green", "blue", stop("No"))

case_when() statements
> dplyr::case_when(
+ x%%5==0~"a",
+ x>6~"great",
+ TRUE ~ as.character(x))

for loops
> for (i in 1:4) print(i)

next exits an iteration
break exits the loop
while() statement
> while(x < 4) {print(x); x<-x+1}

repeat() statement
repeat {print(x); x<-x+1; if(x==5) break}

(**Basics)(**Advanced)
```

Functions 1

"Everything that exists is an object. Everything that happens is a function call."

Types of functions:

closure functions, these are the usual functions created or encountered while using R.

builtin functions, primitive/internal functions that generally take C code and pass their arguments in an evaluated way.

special functions, primitive/internal functions that take C code and pass their arguments in an unevaluated way

The typical syntax for a closure function

```
fname <- function(arg1, arg2, ... ){
  body: expressions and return value
}
fname(arg1 = val1, arg2 = val2)
```

Example:

```
> mysum <- function(x,y){x+y #just make a sum +}
> mysum(1,2)
[1] 3
```

(**Basics)

Functions 2

```
is.object(mysum) FALSE
typeof(mysum) "closure"
class(mysum) "function"
typeof(mysum) "base"
mysum function(x,y){x+y}
prints
typeof(sum) "builtin" functions
mean(2,3,10) != 2 !=
mean(c(2,3,10)) 5

(**Basics)(**Advanced)
```

Functions 2

```
is.object(mysum) FALSE
typeof(mysum) "closure"
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mean(2,3,10) != 2 !=
mean(c(2,3,10)) 5

(**Basics)(**Advanced)
```

Functions 3

Make lists of functions:

```
> funs <- list(
+ half = function(x) x / 2,
+ double = function(x) x * 2)
> funs$double(10); funs$half(10)
```

Arguments are evaluated only if accessed

```
> f <- function(x,y) x+1 #y is ignored
> f(2)
[1] 3
```

Arguments can be defined later

```
> f <- function(x,y) {y<-2;x+y}
> f(2)
[1] 4
```

Arguments can be forced

```
> f <- function(x) {
```

Functions 3 (cont)

```
+ force(x)
+ 10
+}
> f(stop("This is an error!"))
Error in force(x) : This is an error
A promise is forced when its value is needed
> f<-function(x, label = deparse(x)
+ label #this forces the promise
+ x <- x + 1 # change in x does not
+ print(label)}
> f1<-function(x, label = deparse(x)
+ x <- x + 1 #the change in x will
+ print(label)}
> f(1)
[1] "1"
> f1(1)
[1] "2"

(**Advanced)
```