R Basics

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Contents

Getting Started

```
2+2
```

```
## [1] 4
```

```
a <- 2+2
a
```

```
## [1] 4
```

```
A
```

```
## Error in eval(expr, envir, enclos): object 'A' not found
```

```
c(1, 2, 3, 4, 5)
```

```
## [1] 1 2 3 4 5
```

```
1:5
```

```
## [1] 1 2 3 4 5
```

```
x <- 1:100
sum(x)
```

```
## [1] 5050
```

```r
mean(x)
```

```
## [1] 50.5
```

```r
sd(x)
```

```
## [1] 29.01149
```

```r
summary(x)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00   25.75   50.50   50.50   75.25  100.00
```

Inspecting Objects

```r
head(x)
```

```
## [1] 1 2 3 4 5 6
```

```r
tail(x)
```

```
## [1]  95  96  97  98  99 100
```

```r
str(x)
```

```
##  int [1:100] 1 2 3 4 5 6 7 8 9 10 ...
```

Vectorization

```r
head(x+10)
```

```
## [1] 11 12 13 14 15 16
```

```r
head(x*x)
```

```
## [1]  1  4  9 16 25 36
```

Getting Help

```
?mean
example(mean)
```

```
##
## mean> x <- c(0:10, 50)
##
## mean> xm <- mean(x)
##
## mean> c(xm, mean(x, trim = 0.10))
## [1] 8.75 5.50
```

```
?clustering
```

```
## No documentation for 'clustering' in specified packages and libraries:
## you could try '??clustering'
```

```
??clustering
```

File Paths and Data Input

```
setwd("/home/user/")
setwd("C:/Documents and Settings/user")

mydata <- read.csv("mydata.csv")
summary(mydata)
```

Writing Data

```
write.csv(mydata, file="mydata.csv")

saveRDS(object=mydata, file="mydata.rds")

### load rds via load()
load("mydata.rds")
mydata
```

Addon Packages

```
install.packages("devtools")
library(devtools)

devtools::install_github("wrathematics/Rdym")
```

Missingness

```
NA
NA + 1
is.na(NA)
```

Data Structures

- Vectors
- Factors
- Matrices
- Dataframes
- Some other things not worth getting into right now...

Vectors

```
c(1, 2, 3, 4, 5)
```

```
## [1] 1 2 3 4 5
```

```
5:1
```

```
## [1] 5 4 3 2 1
```

```
vec <- 1:5
vec[3] <- NA
vec
```

```
## [1]  1  2 NA  4  5
```

Factors

```
charvec <- c("a", "b", "a", "c", "a", "b", "b")
charvec
```

```
## [1] "a" "b" "a" "c" "a" "b" "b"
```

```
fac <- as.factor(charvec)
fac
```

```
## [1] a b a c a b b
## Levels: a b c
```

Matrices

```
mat <- matrix(rnorm(21), nrow=7, ncol=3)
cov(mat)
```

```
##             [,1]       [,2]       [,3]
## [1,]  0.74644284 -0.4643032 0.08051132
## [2,] -0.46430317  0.5397394 0.26067561
## [3,]  0.08051132  0.2606756 0.68310873
```

Dataframes

```
data.frame(x=mat, charvec=charvec, fac=fac)
```

```
##           x.1         x.2        x.3 charvec fac
## 1 -1.40491791  1.41148552  0.1788725       a   a
## 2  0.37450524  0.09945063 -0.4801041       b   b
## 3  1.10217840 -0.33823483  0.3834288       a   a
## 4  0.19757033  0.04673069  0.2365684       c   c
## 5 -0.06535601 -0.93947648 -1.7003588       a   a
## 6 -0.43528117  0.21676901  0.6305480       b   b
## 7  1.00081421 -0.43655501  0.5899748       b   b
```

Functions

- R is a (mostly) *functional* language.
- No macros, only functions.
- Powerful abstraction.

Interacting with functions

```
vec
```

```
## [1]  1  2 NA  4  5
```

```
median(vec)
```

```
## [1] NA
```

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

```
## [1] 3
```

```
median(vec, TRUE)
```

```
## [1] 3
```

Creating Functions

```
vec
```

```
## [1]  1  2 NA  4  5
```

```
first_number_of_vec <- function(vec) vec[1]
first_number_of_vec(vec)
```

```
## [1] 1
```

```
sum_of_first_and_last <- function(vec){
  sum <- vec[1] + vec[length(vec)]
  return(sum)
}
sum_of_first_and_last(vec)
```

```
## [1] 6
```

Questions?

This presentation is available at github.com/wrathematics/2015SFSURworkshop

Exercises are also available there.