Getting started with R and RStudio

Understanding R code

Object assignment

```
my_var <- 4
my_var
 [1] 4
```

```
b <- "banana"
b
  [1] "banana"
```

Object_name <- value(s)

Objects of single values, data structures, or results of a function are assigned to a variable name by an assignment operator (<-).

Variable names may contain numbers but must begin with a letter.

Commenting

```
n_st <- 100  #Number
of students
n_st
[1] 100
```

Comments follow a # and are not evaluated by R.

Getting help

args(function**)**
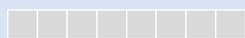Display the argument names and default values of a function

?function or **??**function
Get help for a particular function

example(function**)**
Show example of how to use a function

Data Structures

Vector

One-dimensional data of the same data type
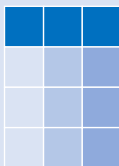
```
> c("A", "Z", "H")
[1] "A" "Z" "H"
```
Join elements into a vector

```
> seq(from=2, to=3,
+ by=0.5)
[1] 2 2.5 3
```
Sequence

```
> rep(1, times=3)
[1] 1 1 1
```
Repeat a vector

Data Frame

Two-dimensional of the same or different data type

```
> df<-data.frame(Var1=c("a","b","c"),
+           Var2=seq(5,15,by=5))
> df
  Var1  Var2
1    a     5
2    b    10
3    c    15
```

df**$**Var1
Select column as vector

summary(df**)**
Summary of each column

nrow(df**)**
Number of rows

ncol(df**)**
Number of columns

rename(df, New_name = Old_name)
Change name of individual columns (dplyr)

Keyboard shortcuts

Ctrl	+	R	Run selected line(s), R
Ctrl	+	Enter	Run selected line(s), RStudio
Ctrl	+	Shift	+	C	(Un)Comment line
Alt	+	-	Inset <-

For macOS, replace Ctrl with Cmd

Matrix

Two-dimensional data of the same data type

```
> matrix(seq(0,9,by=3),
+         nrow=2,ncol=2)
      [,1] [,2]
[1,]    0    6
[2,]    3    9
```
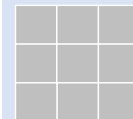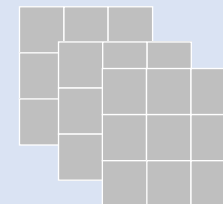
Array

```
> array(c(m1, m2, m3),dim=c(2,2,3))

, , 1
     [,1] [,2]
[1,]    0    6
[2,]    3    9

, , 2
     [,1] [,2]
[1,]    1    7
[2,]    4   10

, , 3
     [,1] [,2]
[1,]    3    9
[2,]    6   12
```
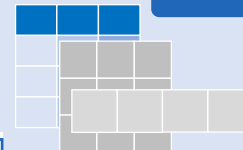
Three-dimensional matrix (rows, columns, and depth)

List

Lists can be composed of different data types and structures

```
> list(1:10, matrix(c("a","b",
+        "c","d"), nrow=2, ncol=2))
[[1]]
[1] 1 2 3 4 5 6 7 8 9 10

[[2]]
     [,1] [,2]
[1,] "a"  "c"
[2,] "b"  "d"
```

Maps, Data and Government Information Centre

Major Data Types

Numeric	Numbers with decimal values, also known as Double. • Integer: numbers without decimal values
Character	Text values defined within '' or "" • Factor: text categories for statistical analysis • Date: calendar values
Logical	Boolean values (TRUE or FALSE)
Missing	Not available / missing values. Can be present in all data types

Determine data type/structure

class(x**)**
Get the class of an object

```
var1 <- "pizza"
class(var1)
[1] "character"
```

Check if data is a specific type
is.<data type>(x)

```
is.character(var1)
[1] TRUE
```

Or data structure
is.<structure>(x)

```
is.data.frame(var1)
[1] FALSE
```

Assign data type/structure

Data types may be specified with
as.<type or str>(x)

```
var2 <- "8"
as.numeric(var2)
[1] 8
```

Change data structure with
as.<structure>(x)

```
as.data.frame(var2)
 var2
1 8
```

Contact:
madgichelp@trentu.ca

TRENT UNIVERSITY LIBRARY & ARCHIVES

Math functions

x **+** y	Addition
x **−** y	Subtraction
x**/**y	Division
x**^**y	Exponentiation
x **%%** y	Modulo (division remainder)
abs(x**)**	Absolute value of x
sqrt(x**)**	Square root of x
log(x**)**	Natural logarithm of x
exp(x**)**	Exponential (e^x) of x
max(x**)**	Largest element in x
min(x**)**	Smallest element in x
mean(x**)**	Average value of x
median(x**)**	Median value of x
sum(x**)**	Sum of all elements in x
sd(x**)**	Standard deviation of x
var(x**)**	Variance of x
round(x, n**)**	Round x to n decimal places
sin(x**)**	Sine of x
cos(x**)**	Cosine of x
tan(x**)**	Tangent of x

R environment

ls()
List all variables in the environment
rm(x**)**
Remove *x* from the environment
rm(**list=ls()**)
Remove all variables from the environment
rm(list=**setdiff(ls(),c("x","y"))**)
Remove all variables from the environment except variables *x* and *y*

Using Packages

install.packages('package'**)**
Download and install a package

library(package**)**
Load the package, making all its functions available to use

help(package = 'package'**)**
View R help documentation for the package

browseVignettes('package'**)**
Package tutorials or workflows

package::function()
Use a function from a specific package

Character functions

toupper(x**)** Convert to uppercase

tolower(x**)** Convert to lowercase

nchar(x**)** Number of characters in a string

substr(x, start, finish**)**
Subset a string from start to finish character number

Also see the **stringr** library

See the data

head(x**)**	**tail(**x**)**	**View(**x**)**	**str(**x**)**
Show the first six values	Show the last six values	Show all data	Compact display of data types and values