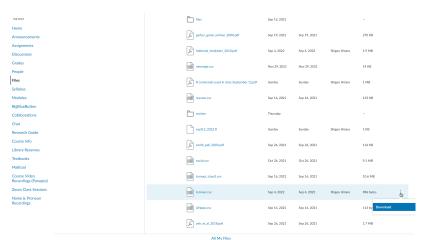
Section 1

Sam Frederick sdf2128@columbia.edu

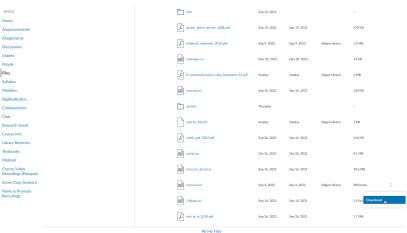
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1. Open Finder on Mac or Windows Explorer on Windows

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 - Example: Research Design

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- 2. Navigate to Desktop (i.e., click on "Desktop")
- 3. Click "File" > "New Folder"
- 4. Give folder a useful title
 - Example: Research Design
- 5. Use this folder to store course materials

RStudio

Let's open RStudio

Arithmetic

2+2			
2-2			
2*2			
2/2			
2^3			

Functions in R

► Functions: perform common tasks for us

Functions in R

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- ► General form:
 - ▶ functionname(arguments)

Functions in R

- Functions: perform common tasks for us
- ► General form:
 - functionname(arguments)
- Getting help for functions:
 - ?functionname
 - args(functionname)

sqrt() takes the square root of whatever you put inside of the parentheses

```
sqrt(4)
```

sqrt() takes the square root of whatever you put inside of the parentheses

```
sqrt(4)
```

c(), or concatenate, combines everything within the parentheses into a vector

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

▶ mean() calculates the average of object within the parentheses

mean(c(1,2,3))

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```
mean(c(1,2,3))
```

median() calculates the median of the object within the parentheses

```
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```

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```
mean(c(1,2,3))
```

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```
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```

▶ sum() adds the values in the vector within the parentheses

```
sum(c(1,2,3))
```

min() calculates the minimum of a vector, and max() calculates the maximum

```
\min(c(1,2,3))
\max(c(1,2,3))
```

summary() gives a variety of these statistics for a vector

```
summary(c(1,2,3))
```

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```
summary(c(1,2,3))
```

▶ length() gives the length of the object within the parentheses

```
length(c(1,2,3))
```

unique() will give all of the unique values in a vector within the parentheses

```
unique(c(1,2,3,1,2,3))
```

x:z will give you the sequence of integers from number x to number z

1:3

x:z will give you the sequence of integers from number x to number z

1:3

seq(a, b, by = z) will give you the sequence of numbers from number a to number b in increments of z

```
seq(1,3, by = 1)

seq(0, 1, by = 0.1)
```

<- is the assignment operator</p>

- <- is the assignment operator</p>
- x<- y assigns value y to object x</p>

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```
x <- 1:3
x
```

- <- is the assignment operator</p>
- x<- y assigns value y to object x</p>

x can be whatever we want it to be but can't start with numbers or contain spaces

We can use functions and perform arithmetic operations on our object assigned above

```
mean(x)
summary(x)
```

Types and Classes of Objects in R: Numeric

- Numeric Data:
 - Integers

```
class(x)
typeof(x)
```

Types and Classes of Objects in R: Numeric

- Numeric Data:
 - Integers

```
class(x)
typeof(x)
```

Doubles

```
class(1.3)
typeof(1.3)
```

Types and Classes of Objects in R: Character

- ► Text Data:
 - Characters

```
"a"
class("a")
```

Types and Classes of Objects in R: Factor

- Categorical Data:
 - Store variables with categories as factor variables

Types and Classes of Objects in R: Factor

- Categorical Data:
 - ► Store variables with categories as factor variables
 - Examples: Party identification, ideology, race, gender

- ► We often want to store multiple vectors containing different data in a cohesive format
 - data.frame

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- Columns are often called variables
 - Accessed using \$ operator
 - Example: surveydata\$party

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- Rows generally represent the observed values for each observation/individual
 - Accessed using []
 - Example: surveydata[1,]
- Can access both columns and rows using []
 - Example: surveydata[row, column]
 - Example: surveydata\$column[row]

Types and Classes of Objects in R: Logical

- ► Logical/Boolean Data:
 - ► TRUE or FALSE

```
class(TRUE)
class(FALSE)
class(c(TRUE, TRUE, FALSE))
```

Logical Operators

- == tests whether one object is equivalent to another
- != tests whether one object is not equivalent to another
- < (or >) tests whether one object is less than (or greater than) another
- <= (or >=) tests whether one object is less than or equal to (or greater than or equal to) another

```
2==2
2==3
2!=3
2<3
```

Missing Data

- Missing data often appear as NA in R
- ▶ NA is a special type of logical object
- Sometimes have to remove NA values to calculate desired quantities

```
class(NA)
mean(c(1,2,3, NA))
mean(c(1,2,3, NA),na.rm = T)
```

Missing Data

- Missing data often appear as NA in R
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```
class(NA)
mean(c(1,2,3, NA))
mean(c(1,2,3, NA),na.rm = T)
```

Remember you can use ? to learn more about function arguments

Example