THE UNIVERSITY OF TEXAS AT AUSTIN
McCOMBS SCHOOL OF BUSINESS

Introduction to R

Lecture 2

STA 371G

RStudio

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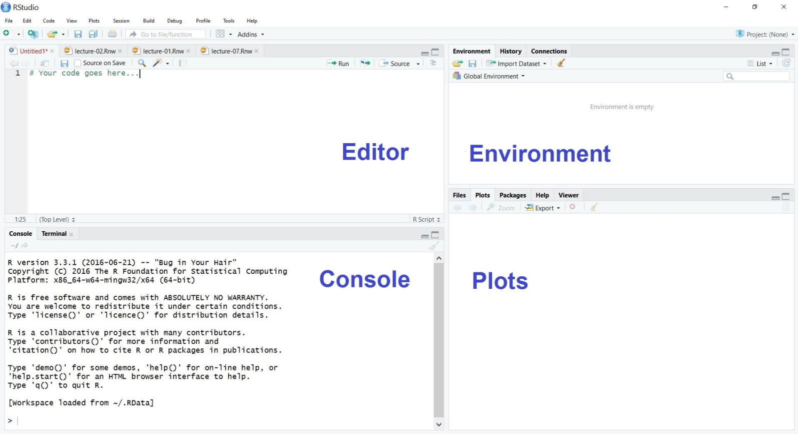

```
# Your code goes here...
```

```
R version 3.3.1 (2016-06-21) -- "Bug in Your Hair"
Copyright (C) 2016 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[Workspace loaded from ~/.RData]

>
```

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- Plots: When we plot things, they will first appear here.

Let’s get started...

Suppose you want to calculate your course grade.

Assignment	Weight	Grade
Class participation	5%	91
Reading assignments	5%	95
Homework	15%	86
Project	15%	83
Midterm 1	20%	88
Midterm 2	20%	84
Final exam	20%	76

Using the console

Try this in the console (enter all on one line and press Enter):

```
0.05*91 + 0.05*95 + 0.15*86 + 0.15*83 +
  0.2*88 + 0.2*84 + 0.2*76

[1] 84.25
```

Using the console

We can also assign the result of a calculation to a variable. Here we’ll create a variable called `grade` which will contain the result of our calculation:

```r
grade <- 0.05*91 + 0.05*95 + 0.15*86 + 0.15*83 +
  0.2*88 + 0.2*84 + 0.2*76
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```r
grade <- 0.05*91 + 0.05*95 + 0.15*86 + 0.15*83 +
  0.2*88 + 0.2*84 + 0.2*76
```

Now we can do calculations using that variable. For example, what will our grade be if the grades are curved up by 5 points?

```r
grade + 10

[1] 94.25
```

Using the editor

In R, an *vector* is just a list of numbers. Let’s redo the calculation using vectors:

```r
# This is the same calculation, using vectors.
weights <- c(0.05, 0.05, 0.15, 0.15, 0.2, 0.2, 0.2)
grades <- c(91, 95, 86, 83, 88, 84, 76)
weighted.grades <- weights * grades
my371 <- sum(weighted.grades)
```

The multiplication is “element-wise,” meaning that the corresponding elements in each vector are multiplied.

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The multiplication is "element-wise," meaning that the corresponding elements in each vector are multiplied. Then, the `sum` function adds up all the elements in the resulting vector.

Working with tabular data

Many data sets we will work with are in tabular format, saved in “CSV” files (CSV = comma-separated values).

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Let’s analyze the passenger data from the Titanic disaster. Load the file by copying and pasting the command from Learning Catalytics, and then type `View(titanic)` to view the data set.

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Let's analyze the passenger data from the Titanic disaster. Load the file by copying and pasting the command from Learning Catalytics, and then type `View(titanic)` to view the data set.

This data has five variables:

- Name: The name of the passenger
- PClass: The class of the passenger (1st, 2nd, etc)
- Age: The age of the passenger, in years
- Sex: The sex of the passenger
- Survived: Whether the passenger survived the disaster

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`$` is used to refer to a particular column in the data, such as `titanic$Name`.

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To access to an element in a particular position, e.g., row 1, column 4, use `titanic[1,4]`.

Exploring Categorical Variables

The dataset has both quantitative and categorical data. (What’s the difference?)

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Let’s explore the categorical variables through some frequency tables.
Let’s say we want to get a frequency table of the number of passengers by class:

```
table(titanic$PClass)



1st 2nd 3rd
323 279 711
```

Exploring Categorical Variables

What is more interesting is a two-way table showing how many people survived in each passenger class. We'll assign the table to a variable for later use!

```
class_survival <- table(titanic$Survived, titanic$PClass)
class_survival
```

```
      1st 2nd 3rd
  No  130 160 573
  Yes 193 119 138
```

Exploring Categorical Variables

To get a better sense of the data, let’s calculate the survival percentage for each passenger class.

```
prop.table(class_survival, 2)
```

```
          1st       2nd       3rd
No  0.4024768 0.5734767 0.8059072
Yes 0.5975232 0.4265233 0.1940928
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          1st       2nd       3rd
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```

It looks like one’s chance of survival highly depended on his/her passenger class!

Slicing the data

One very common operation is slicing the data, i.e., selecting the portion that satisfy certain conditions.

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For example, we can select the rows that belong to female passenger data.

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female.passengers <- subset(titanic, Sex == "female")
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For example, we can select the rows that belong to female passenger data.

```r
female.passengers <- subset(titanic, Sex == "female")
```

This means: in the titanic dataset, select rows where Sex is `female` and save the resulting table to the `female.passengers` variable.

Slicing the data

We can create more complex conditions – what do you think this does?

```
my.data <- subset(titanic, Sex == "female" &
                           PClass == "1st")
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                           PClass == "1st")
```

We can use the `nrow` function to count the number of rows in a dataset:

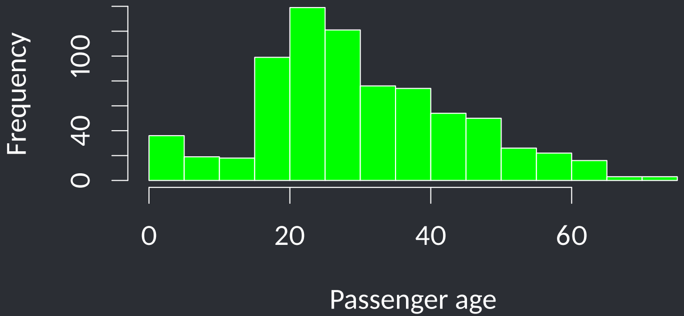
```
nrow(my.data)

[1] 143
```

There were 143 women in first class on the Titanic!

Exploring quantitative data

Let’s look into age distribution of the passengers.

```
hist(titanic$Age, col="green",
     xlab="Passenger age", main="")
```



Exploring quantitative data

We can look at the relationship between a quantitative variable and a categorical one by generating side-by-side boxplots to compare the distribution of the quantiative variable for each value of the categorical variable:

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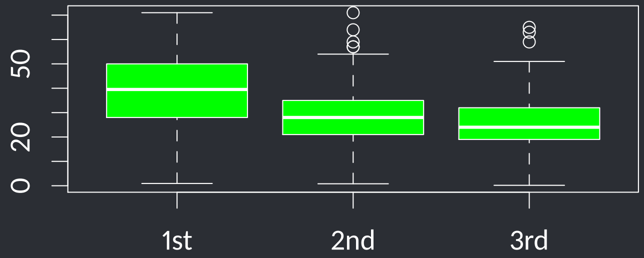
```
boxplot(Age ~ PClass, data=titanic, col="green", main="")
```


1st
2nd
3rd