Stat261 – Lab 0
January 19, 2024

Topics: R, RStudio, R Markdown. Optional: Coding styles for R, LaTeX, rgeom().
Hand in: Lab0.pdf (Practice submission)

It is assumed that, prior to this lab, you have successfully created your **DataCamp** account using the invitation link on Brightspace.

> *DataCamp is an online learning site for R and other Data Science courses. As a student in this course, you will be given a FREE account on DataCamp for use during the lab portion of the course. Use the link on Brightspace (under the "Lab Materials" module) to set up your free DataCamp account for the term.* ***It is important that you use your UVic email account to set up your DataCamp account!*** **Other email accounts will NOT work!**

Lab Overview:

> *For students using their own computers, R must be installed: https://www.cran.r-project.org/.*
> *RStudio must also be downloaded: https://www.rstudio.com/.*

1. Log in to the computer using your Netlink ID and password. **We will make a folder in our personal directories for these labs.** Your personal directory can be accessed by you from any computer on campus.
   a. Click on the File Explorer (Folder icon) in the taskbar and Click on your name in the sidebar.
   b. Go to Documents. NOTE: There are two Documents icons– the first one is attached to your personal directory (folder path should read \\home.uvic.ca\<your netlink ID>\My Documents), the second one is in the C: drive for the computer you are sitting at. Make a new folder called "Stat 261 Labs".
2. **Start-up RStudio on the lab computer.** There are four main panels in the RStudio interface. The top left panel is the source panel, and the bottom left is the console. Other useful tabs and information are in the two right-hand panels.
3. **Create a new script** (File/New File/R Script) and save the file (in \\home.uvic.ca\<your netlink ID>\My Documents\Stat 261 Labs) as *Lab1.R*. To utilize packages, they must first be installed and then loaded. Type the following code into your script to install and load the RMarkdown package:

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

Run the two lines of code from the script file. See the Run button on the top right of the source panel.

   a. The package can also be installed using the GUI: click on Packages tab (bottom right panel) and then Install.

4. The package we just installed is used to create notebook documents that format text and code together in a neat and convenient manner. **Create a new RMarkdown file.** Title it Lab 0, put your name as the author, and set the default output format to PDF.

    a. Save the file as *Lab0.Rmd*.

    b. Knit the file to PDF by pressing the Knit button. Note that you can still knit to Word and HTML by selecting either option from the dropdown menu next to the Knit button. It is normal for the first "Knit" to take a minute or so.

    c. **Examine the code and the output file.** You may find this cheatsheet useful. More information about R Markdown is available at: http://rmarkdown.rstudio.com/lesson-1.html.

5. Submit the Lab0.pdf file to the **"Lab 0 (Practice submission)"** Assignment on Brightspace.

6. Log onto the DataCamp website, then the link https://learn.datacamp.com/courses and click on the Course, **Introduction to R**. Work through the first three chapters: ***Intro to basics***; ***Vectors***; ***Matrices***. A summary of what you'll learn is included at the end of this document.

    a. *If you have already completed the Intro to R series*, perhaps in a previous course, you are welcome to work through Software Carpentry's free course on programming with R, available here. This course aims to teach useful R programming by walking you through the common task of data analysis. Some lessons in this course may go beyond the level of R programming that is expected of you in this course, but the course itself is well-written and the material is useful if you are planning on pursuing a career in statistics/data science.

    b. If you instead prefer more Datacamp series to work through, these are recommended:
    - Intermediate R, Intermediate R practice
    - Data Visualization in R
    - Introduction to Writing Functions in R
    - Introduction to Data in R
    - Foundations of Inference in R

    Take advantage of the Datacamp access while you have it!

Optional:

7. Read Coding styles for R: http://adv-r.had.co.nz/Style.html

8. Create a code chunk in Lab0.Rmd and generate 10 random values from the geometric(0.3) distribution using the function `rgeom()`. Save the results into a variable called "`geo.dat`" and print it. Knit the file.

9. Test LaTeX code in RMarkdown (Advanced for LaTeX users). Enter this in a text area in the file *Lab1.Rmd* and knit the file again:

```
$$\beta_{1} = \frac{\Sigma_{i=1}^n (x_{i} - \bar{x}) (y_{i} - \bar{y})}{\Sigma_{i=1}^n (x_{i} - \bar{x})^2}$$
```

Summary of R learned in DataCamp, Introduction to R lessons 1-3

1. Basics

   Addition: +
   Subtraction: -
   Multiplication: *
   Division: /
   Exponentiation: ^
   Modulo: %% returns the remainder of the division

   <- assignment

   Data types: numerics, integers, logical, characters
   class()

2. Vectors

   c()
   names()
   sum()
   vector selection []
   sequence operator :
   mean()
   Logical operators: <, >, <=, >=, ==, !=

3. Matrices

   matrix()
   rownames()
   colnames()
   rowSums(), colSums()
   cbind()
   rbind()