BIOC8145 Homework #2
(100 pts total; Due Friday 4/3/20)

1. There are a number of ways to access R and RStudio. To see how to access R and RStudio on Rivanna, go to the following web site: https://www.rc.virginia.edu/userinfo/rivanna/software/r/.
2. First, try the approach under "Loading the R module". You first type "module load gcc R". This loads R/makes it available to you. Next, type "R". You're now in R. What version of R are you running? Can you load different versions? Now type "q()" ("q" followed by "(" and ")") to quit R. Type "n" when asked if you want to "Save workspace image?". You can execute commands using this approach, but it's very clunky for attempting to write and save scripts/programs.
3. Second, try the approach under "Loading the RStudio module". Note, Mac users have to install XQuartz for this to work, and Windows users should install and be accessing a Rivanna Unix terminal via MobaXterm. This essentially allows graphics to be exported to your local machine. This can be painfully slow! So, go to "File"->"Quit Session" in the upper left-hand corner.
4. Third, at the bottom of "Loading the RStudio module", you'll see a link to "Rstudio Server access via OpenOnDemand". Click on this link. Click on "Launch Open OnDemand". Go to the "Interactive Apps" tab at the top and select "RStudio Server". At the bottom of the page that appears, click on "Launch". When it pops up, click on "Connect to RStudio Server". You should now be in RStudio. Go to "File->"New File"->"R script". This will open the console in the upper left quadrant of RStudio.
5. Go through the R_lab.pdf typing all commands and answering all questions (25 pts).
6. In a new window on your internet browser, go to https://workshops.rc.virginia.edu/lesson/. You'll see a number of useful lessons. Click on the "R PROGRAMMING" link under "Topic". You'll see all the R programming tutorials available. Click on the "Introduction to R" lesson. Go through this lesson/tutorial typing all the commands and answering all the questions/working through all the exercises (25 pts). Notes:
    a. Right before EXERCISE 2, they make a critical typo in the sentence "Finally, see how you can *next* one function…". The word "*next*" should be "*nest*".
    b. I downloaded the "brauer2007_tidy.csv" file. You can copy it to your home directory by executing the copy command "cp /home/sb3de/brauer2007_tidy.csv". Move the file to the directory you choose to work in using RStudio. If you launched RStudio as requested above and did not change your working directory, then your working directory is your home directory and the rest of the lesson should work.
    c. You likely have to install the packages "readr" and "dplyr". Go to (top right) "Tools ->Install Packages…" and type in each package name and

click “Install”. Now the commands “library(readr)” and library(dplyr)”, which load these packages into your R session, will work.

   d. Generate a histogram of gene expression by executing the command “hist(ydat$expression)”.

7. On the Topics/R Programming site, click on the next R tutorial “R Data Manipulation”. Go through this lesson/tutorial typing all the commands and answering all the questions/working through all the exercises (25 pts).
8. On the Topics/R Programming site, click on the next R tutorial “R Data Visualization”. Go through this lesson/tutorial typing all the commands and answering all the questions/working through all the exercises (25 pts). Notes:
   a. I downloaded the “gapminder.csv” file. You can copy it to your home directory by executing the copy command “cp /home/sb3de/gapmnder.csv”. Move the file to the directory you choose to work in using RStudio. If you launched RStudio as requested above and did not change your working directory, then your working directory is your home directory and the rest of the lesson should work.