COMP 364 - Tools for the Life Sciences

Assignment #0: Basic R and RStudio Infrastructure
Due: February 4, 2016
10% of total grade

The goal of the assignment is to ensure that you have been able to initiate an R session through RStudio, and to explore the basic R environment. The assignment also asks that you use several bioinformatics-related tools that are available in the public domain to investigate general questions regarding bioinformatics.

Question 1: [30% of assignment]

1.1 Create a new R script file and name it "I.heart.R".

1.2 Figure out how to ask R what the date is. Put this command in the I.heart.R file.

1.3 Using only 5 characters (!), find a way in R to print out the first 500 integers (1, 2, 3, …, 500). Now put this command in the I.heart.R file.

1.4 The top left quadrant of RStudio contains all the files you have opened, including your I.heart.R file. What does it mean when the name of the file is red?

1.5 Run your two line program, and take a screen shot of your RStudio session (on Macs you can use the Grab tool in the Application/Utilities folder. Check here for instructions tailored to every operating system http://www.take-a-screenshot.org/). Save it on your machine and name it "I.heart.R.screenshot".

Question 2: [20% of assignment]

2.1 Open the miniTCGA.R file (~/repos/comp364/src/miniTCGA.R). Add a comment at the top of this file saying "This is MY miniTCGA.R file and anyone else who uses it will be sued." Save it.

Copy and paste the entire file into the R session (you can select everything in the file in the top left (TL) quadrant and then hit the "Run" button (top right of the TL quadrant).

Now run the following commands in the R window

```
x <- 5
y <- 7
z <- x*y
miniT <- load.miniTCGA( dataDir = ''~/repos/comp364/dat'' )
```

(Note: the quotes should be your standard double quotes… sometime Word and other software replace the standard double quote with fancy double quote and you will get an error.)
How many variables are defined in your environment? How big is miniT?
(Hint: top right (TR) quadrant). From the miniTCGA.R file, can you tell what kind of data was loaded?

2.4 How many files does GIT say have been modified? Commit any changed files by first "staging" them (just check off the box) and then pressing the Commit box. Create a PDF file or screenshot of the history of all Commits your project.

Question 3: [20% of assignment]
3.1 Download the pdf of the "Introduction to R" manual from the R homepage.

3.2 Copy the pdf of the R manual to your comp364 repository.

3.4 Initiate an RStudio session and open the project "comp364". What does GIT report? Commit any changes.

Question 4: [30% of assignment]

5.1 Using And, Or and Not gates as discussed in class, construct an "exclusive" OR gate (sometimes written, XOR gate).

The And gate has the following table (both inputs have to be true). Here 1 = TRUE and 0 = FALSE.

Input 1	Input 2	Output

0	0	0
1	0	0
0	1	0
1	1	1

The Or gate has the following table (at least one input has to be true).

Input 1	Input 2	Output
0	0	0
1	0	1
0	1	1
1	1	1

The Negate gate has the following table (reverse the input).

Input	Output
1	0
0	1

The Exclusive OR gate that you are to build by “fitting together” (like a lego puzzle) has the following table (exactly one input is true; not both inputs).

Input 1	Input 2	Output
0	0	0
1	0	1
0	1	1
1	1	0

5.2 In our house, on any given day, the father can either be exhausted or full of energy. The mother can either be exhausted or full of energy. Each of the three children have either eaten a proper number of vegetables at lunch or not. We order pizza when at least one of the two parents is exhausted and at least 2 of the 3 children have had enough vegetables. Design a circuit using And, Or, and Not gates as best you can that outputs 1 (TRUE) if we should call for pizza or 0 (FALSE) if we cook ourselves.
