Lab Polite Customs

Abhi Thanvi, Paul Holaway

July 5th, 2022

Contents

Lab Polite Customs **2**

Welcome 2

The Idea of this Lab 2

Problem 1: The Warmup Before Dash! 2

Problem 2: Geometry Dash 4

Problem 3: Mystery Function 6

Submission 6

Lab Polite Customs

Welcome

Just like learning a new spoken language, you will not learn the language without practice. Labs are an important part of this course. Collaboration on labs is **extremely encouraged**. If you find yourself stuck for more than a few minutes, ask a neighbor or course staff for help. When you are giving help to your neighbor, explain the **idea and approach** to the problem without sharing the answer itself so they can figure it out on their own. This will be better for them and for you. For them because it will stick more and they will have a better understanding of the concept. For you because if you can explain it to other students, that means you understand it better too.

The Idea of this Lab

The idea behind this lab is to respect the customary steps of learning any computer science language. It is to learn loops, if/else statements, and writing your own functions (some languages call it "methods"). This is crucial to learn to write efficient code as these allow you to write logical, non-repetitive, and clean code for others to understand. Just like sharing your analysis, people read your code! When you write good code, people find it easier to understand what you did and really appreciate it. Consider this lab to be the one that gets your feet wet for the "Pure CS" portion of Data Science.

"I am not a huge fan of Froot Loops, but I do love writing loops" - Honest Abhi

Problem 1: The Warmup Before Dash!

Question 1: We want to calculate the area of a circle, given some of the parameter. Let's just dive in.

Answer:

```
#SETUP DO NOT DELETE
set.seed(143572)
radius_seq = sample(1:10,5, replace=FALSE)
radius_seq
```

```
## [1]  4  2 10  7  9
```

```
##Code here
Area = function(radii) {
  #Complete The Function to calculate the Area
  Area = pi * (radii*radii)
  return(Area)
}
#Use Your Custom Function
Area(radius_seq)
```

```
## [1]  50.26548  12.56637 314.15927 153.93804 254.46900
```

Question 2: Write code to generate a sequence of 25 random but unique integers (whole) numbers in the range of 1 - 100.

Answer:

```
#DO NOT CHANGE THIS
set.seed(143572)

#Code Here
seq = sample(1:100, 25, replace=FALSE)
seq
```

```
##  [1]  52  34  23  82  41 100  48  22  33   9  81  44  20  59  19  73  39   5  88
## [20]  57  24  12  15  10  21
```

Question 3: Write code to generate a sequence of 25 random but unique numbers in the range of 1 - 100. These do not have to be integers or whole numbers.

Answer:

```
seq = runif(25, min = 0, max=100)
seq
```

```
##  [1] 75.219182 51.784564 62.904468 97.905388 20.171155 33.171590  4.379110
##  [8] 89.000837 76.985649 38.689930  6.307077 75.350775 47.814053 31.408675
## [15]  1.777096 20.343150 92.061941 14.020999 89.330198 84.996178 78.061189
## [22] 91.280781 51.786616 21.673766 74.810156
```

Problem 2: Geometry Dash

Question 1: We want to calculate the volume of a cylinder, given the parameters radius and height. Create a custom function that calculates the Volume of a cylinder given those parameters. Make sure to test your function by printing a solution.

Answer:

```
##Code here
Volume = function(radii, height) {
  #Complete The Function to calculate the Volume
  Area = pi * (radii*radii) * height
  return(Area)
}
#Use Your Custom Function
Volume(1, 1)
```

```
## [1] 3.141593
```

Question 2: We are given two coordinates (x_1, y_1) and (x_2, y_2), and we need to calculate the slope m. Write a custom function that takes in (x_1, x_2, y_1, y_2) as its parameter and calculate its slope. There are different ways to code this, it's up to you! Make sure to test your function by printing a solution.

Answer:

```
##Code here
Slope = function(x1,x2,y1,y2) {
  delta_x = x2-x1
  delta_y = y2-y1

  slope = delta_y / delta_x
  return(slope)
}
#Use Your Custom Function
Slope(2,1,3,1)
```

```
## [1] 2
```

Question 3: We are given a task to print numbers 1-10, but we are not allowed to use `runif()` or `sample()`. Can you code a way to print the sequence of numbers 1-10 (integers). We are looking for a specific type of answer that we learned in lesson. The sequence should be *ascending*.

Hint: Pay attention to the order of printing, we want ascending

Answer:

```
for (i in 1:10) {
  print(i)
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
```

```
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10
```

Question 4: We are given a task to print numbers 1-25 but they should be negative, but we are not allowed to use `runif()` or `sample()`. Can you code a way to print the sequence of negative numbers 1-25 (integers). We are looking for a specific type of answer that we learned in lesson. Oh also, to get you thinking, the sequence should be *ascending*.

Hint: Pay attention to the order of printing, we want ascending

Answer:

```
for (x in -25:-1) {
   print(x)
}
```

```
## [1] -25
## [1] -24
## [1] -23
## [1] -22
## [1] -21
## [1] -20
## [1] -19
## [1] -18
## [1] -17
## [1] -16
## [1] -15
## [1] -14
## [1] -13
## [1] -12
## [1] -11
## [1] -10
## [1] -9
## [1] -8
## [1] -7
## [1] -6
## [1] -5
## [1] -4
## [1] -3
## [1] -2
## [1] -1
```

Problem 3: Mystery Function

This question should be filled out, but it is a higher level of thinking question.

Question:

```
#QUESTION DO NOT CHANGE THIS
Mystery = function(x, y) {
  prod = x * y
  if (prod != x*x) {
    return ("NO")
  }
  return ("YES")
}
```

What is the mystery function doing? Justify your reasoning

Answer: (Student Response Here) The mystery function is checking if x and y are equal. It compares the product of x times y to x times x basically checking if y = x and returning yes if it is, otherwise returns no.

Submission

Once you have finished your lab...

1. Go to the top left and click `File` and `Save`.
2. Click on the `Knit` button to convert this file to a PDF.
3. Submit **BOTH** the `.Rmd` file and `.pdf` file to Blackboard by 11:59 PM tonight.