Class 06: R Functions

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Table of contents

Class 06

All functions in R have at least 3 things:

- A **name** (we pick this)
- Input **arguments** (there can be loads, comma separated)
- A **body** (the R code that does the)

```
# Example input vectors to start with
student1 <- c(100, 100, 100, 100, 100, 100, 100, 90)
student2 <- c(100, NA, 90, 90, 90, 90, 97, 80)
student3 <- c(90, NA, NA, NA, NA, NA, NA, NA)
```

Q1.

Write a function grade() to determine an overall grade from a vector of student homework assignment scores dropping the lowest single score. If a student misses a homework (i.e. has an NA value) this can be used as a score to be potentially dropped.

```
#Define grade function
grade <- function(student) {
#Define student and Sort their grades
   student_sorted <- sort(student, decreasing=T, na.last=T)
   student_dropped <- head(student_sorted, n=-1)
   no_NA <- replace(student_dropped, is.na(student_dropped), 0)
   mean(no_NA)}
```

The overall grade of Student 1 is 100

The overall grade of Student 2 is 91

The overall grade of Student 3 is 12.8571429

Q2.

Using your grade() function and the supplied gradebook, Who is the top scoring student overall in the gradebook? [3pts]

- Load the dataset

```
gradebook <- read.csv("student_homework.csv", row.names=1)
gradebook_student_averages <- apply(gradebook,1, grade)
```

-Output the highest student average The top student in the overall gradebook is Student 18

Q3.

From your analysis of the gradebook, which homework was toughest on students (i.e. obtained the lowest scores overall? [2pts]

-Convert NA to 0s for scores

```
gradebook_no_NA <- replace(gradebook,is.na(gradebook),0)
```

-Create a function to calculate homework averages

```
homework_difficulty <- function(homework)
  {mean(homework)}
```

-Use the function to calculate homework averages

```
gradebook_homework_averages <- apply(gradebook_no_NA[c(1:20),],2,homework_difficulty)
gradebook_homework_averages
```

```
  hw1   hw2   hw3   hw4   hw5
89.00 72.80 80.80 85.15 79.25
```

-Output which homework had the lowest average The toughest homework for students was Homework 2

Q4.

```
mask <- gradebook
mask[ is.na(mask) ] <- 0

hw_scores <- apply(gradebook, 2, sum, na.rm=T)
hw_scores
```

```
 hw1  hw2  hw3  hw4  hw5
1780 1456 1616 1703 1585
```

The homework that students scored lowest on was 2

Q5. Make sure you save your Quarto document and can click the "Render" (or Rmark- down"Knit") button to generate a PDF foramt report without errors. Finally, submit your PDF to gradescope. [1pt]