Lab 6: R Functions

Torrey (A14397504)

All about functions in R

Every function in R has at least 3 things: - name (you choose) - arguments (the input(s)) - the body

Today we will write a function to grade a class of student assignment scores.

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. Your final function should be adequately explained with code comments and be able to work on an example class gradebook such as this one in CSV format: "https://tinyurl.com/gradeinput" [3pts]

```
# load gradebook
gradebook <- read.csv("https://tinyurl.com/gradeinput", row.names = 1)
# load practice data
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)

# write function
grade <- function(x) {
  # convert NAs to 0
  x[is.na(x)] <- 0
  # drop the lowest score
  x_dropped <- x[-which.min(x)]
  # calculate the average
  mean(x_dropped)
}

# grade practice students
grade(student1)
```

```
[1] 100
```

```
grade(student2)
```

```
[1] 91
```

```
grade(student3)
```

```
[1] 12.85714
```

Q2. Using your grade() function and the supplied gradebook, Who is the top scoring student overall in the gradebook? [3pts]

```
# who got the highest score?
which.max(apply(gradebook,1,grade))
```

```
student-18
        18
```

```
# what is their score?
max(apply(gradebook,1,grade))
```

```
[1] 94.5
```

Q3. From your analysis of the gradebook, which homework was toughest on students (i.e. obtained the lowest scores overall? [2pts]

```
# Answer depends on interpretation.
# Not doing the HW (NA) probably means the student was busy, not that it was tough.
# I will choose to remove NAs.

which.min(apply(gradebook, 2, mean, na.rm = T))
```

```
hw3
  3
```

```r
min(apply(gradebook, 2, mean, na.rm = T))
```

```
[1] 80.8
```

Q4. Optional Extension: From your analysis of the gradebook, which homework was most predictive of overall score (i.e. highest correlation with average grade score)? [1pt]

```r
# store final score for each student
scores <- as.data.frame(apply(gradebook,1,grade)); colnames(scores) = "scores"
# add to gradebook
gradebook <- cbind(gradebook,scores)

# calculate correlation between each HW and final score
# again, choosing to remove NA values
cor <- cor(gradebook[,1:5], gradebook[,6], method = "pearson", use = "pairwise.complete.ob

# which HW is most predictive of the final score? what is the correlation?
which.max(cor); max(cor)
```

```
[1] 2
```

```
[1] 0.6114277
```

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