Class06

Job Rocha PID A59023124

All about functions in R

Every function in R has at least 3 things: - name (you pick it) - arguments (the inputs(s) to your function), and - the body.

Today we will write a function to grade a class of student assignment scores (e.g. homeworks, etc).

First I will work with a simplfied vector input where I know where the answer should be

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)
```

Let's start slow and find the average for student1

```
mean(student1)
```

```
[1] 98.75
```

How can we drop the lowest score? I can use the `which.min()` function to find the lowest score (element in the vector)

```
student1
```

```
[1] 100 100 100 100 100 100 100  90
```

```
which.min(student1)
```

[1] 8

```
mean(student1[-which.min(student1)])
```

[1] 100

We can "mask" the NA or change them to be zero, The rational here is if you don't do a hw you get zero.

We can use the `is.na()` function to find where the missing homeworks are in the input vector

```
student2
```

[1] 100 NA 90 90 90 90 97 80

```
is.na(student2)
```

[1] FALSE TRUE FALSE FALSE FALSE FALSE FALSE FALSE

```
student2[is.na(student2)]
```

[1] 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. Your final function should be adquately 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]

```
grade <- function(grade.vector){
  # Mask NA to zero
  grade.vector[is.na(grade.vector)] <- 0
  # Get the index of the minimum grade
  index.min <- which.min(grade.vector)
  # Calculate Mean
```

```
    return( mean(grade.vector[-index.min]) )
  }
```

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

```
gradebook <- read.csv('https://tinyurl.com/gradeinput', row.names=1)
names(which.max(apply(gradebook, 1, grade)))
```

```
[1] "student-18"
```

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

```
mask <- gradebook
mask[is.na(mask)] <- 0
names(which.min(apply(mask, 2, mean, na.rm=TRUE)))
```

```
[1] "hw2"
```

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]

```
names(which.max(apply(mask,2,cor, y=apply(gradebook, 1, grade))))
```

```
[1] "hw5"
```

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