

Lab 06

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Question 1:

Write a function `grade()` to determine an overall grade from a vector of student homework assignment scores dropping the lowest single score.

This function will provide the grade for a student given a vector of their scores, and will provide the average of all scores while dropping the lowest score.

```
grade <- function(scores) {  
  scores <- as.numeric(scores)  
  scores[is.na(scores)] <- 0  
  scores <- scores[-which.min(scores)]  
  return(mean(scores))  
}
```

When tested on these student cases, the `grade` function should result in the average score of student1 without the **90**, student2 without the **NA** and student3 without one **NA** and the rest of the NAs represented as a 0.

```
# 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)
```

```
#Test 'grade' function  
c("Student 1" = grade(student1),  
  "Student 2" = grade(student2),  
  "Student 3" = grade(student3))
```

```
## Student 1 Student 2 Student 3  
## 100.00000 91.00000 12.85714
```

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

Question 2:

Who is the top scoring student overall in the gradebook?

Apply the `grade` function across all students in the `gradebook` dataframe. Then, identify the student with the maximum calculated grade average.

```
adjusted_averages <- apply(gradebook, 1, grade)  
adjusted_averages[which.max(adjusted_averages)]
```

```
## student-18  
## 94.5
```

Question 3:

Which homework was toughest on students?

Generate a copy of the gradebook dataframe, and convert all *NA* values to 0.

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

Apply the mean function across the homeworks in the gradebook dataframe. Then, identify the homework with the minimum calculated grade average.

```
hw_averages <- apply(gradebook_mask, 2, mean)
hw_averages[which.min(hw_averages)]
```

```
## hw2
## 72.8
```

Question 4:

Which homework was most predictive of overall score?

Using the *cor* function, calculate the correlation between each student's score for a homework assignment and the average score of each student for that homework assignment. Then, identify the homework with the strongest correlation.

```
homework_correlations <- cor(gradebook_mask, adjusted_averages)
homework_correlations[which.max(homework_correlations),1]
```

```
## hw5
## 0.6325982
```