

Class 06 R Functions

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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]

#Example inputs to start

```
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 on stu1

```
#rm lowest score
x <- student1[-which.min(student1)]
mean(x)
```

```
[1] 100
```

#test on stu2

```
x <- student2
#replace NA with 0
x <- replace(x, is.na(x), 0)
#rm lowest score
x <- x[-which.min(x)]
mean(x)
```

```
[1] 91
```

#Making the function

```
grade <- function(student) {
  x <- student
  x <- replace(x, is.na(x), 0)
  x <- x[-which.min(x)]
  y <- mean(x)
}
```

#Function testing

```
grade(student1)
grade(student2)
grade(student3)
```

#Reading the csv in

```
gradebook <- read.csv("student_homework.csv", row.names = 1)
gradebook[1,]
```

```
      hw1 hw2 hw3 hw4 hw5
student-1 100  73 100  88  79
```

#testing function on df

```
# apply function to whole df using apply()
#apply(df, 1 = rows only, function)
classgrades <- apply(gradebook, 1, grade)
```

```
classgrades
```

```
student-1 student-2 student-3 student-4 student-5 student-6 student-7
  91.75    82.50    84.25    84.25    88.25    89.00    94.00
student-8 student-9 student-10 student-11 student-12 student-13 student-14
  93.75    87.75    79.00    86.00    91.75    92.25    87.75
student-15 student-16 student-17 student-18 student-19 student-20
  78.75    89.50    88.00    94.50    82.75    82.75
```

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

```
which.max(classgrades)
```

```
student-18
  18
```

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

```
gradebook0 <- replace(gradebook, is.na(gradebook), 0)
```

```
hw <- apply(gradebook0, 2, sum)
```

```
hw
```

| hw1 | hw2 | hw3 | hw4 | hw5 |
|------|------|------|------|------|
| 1780 | 1456 | 1616 | 1703 | 1585 |

```
#Homework 2 was the toughest on students
```

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]

```
apply(gradebook0,2, cor, y = classgrades )
```

| hw1 | hw2 | hw3 | hw4 | hw5 |
|-----------|-----------|-----------|-----------|-----------|
| 0.4250204 | 0.1767780 | 0.3042561 | 0.3810884 | 0.6325982 |

```
# cor(gradebook0, classgrades)  
#Homework 5 was most predictive of overall score
```