

Class 06: R Functions Lab

Katherine Lim (A15900881)

```
# Example students to test the function on
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. 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]

```
grade <- function(scores) {

  # This will replace NA scores with 0
  scores[is.na(scores)] <- 0

  # This will drop the lowest single score
  scores <- scores[-which.min(scores)]

  # This will get the average of the remaining scores
  avg_score <- mean(scores)

  # Return the average score
  return(avg_score)
}

# This will read in the class data from CSV
url <- 'https://tinyurl.com/gradeinput'
scores <- read.csv(url, row.names = 1)
head(scores)
```

	hw1	hw2	hw3	hw4	hw5
student-1	100	73	100	88	79
student-2	85	64	78	89	78
student-3	83	69	77	100	77
student-4	88	NA	73	100	76
student-5	88	100	75	86	79
student-6	89	78	100	89	77

```
# This will apply the grade function to the gradebook
apply(scores, 1, grade)
```

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]

```
# Return the student with the highest overall grade in the gradebook
gradebook <- apply(scores, 1, grade)

# Find the student with the highest average grade after dropping the lowest score
top_student <- gradebook[which.max(gradebook)]

# Return the top student
top_student
```

```
student-18
94.5
```

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

```
# Return the homework assignment with the lowest average grade

# Count NA scores as a 0
NA_to_zero <- function(scores) {
```

```

    scores[is.na(scores)] <- 0
    return(scores)
}

# Find the average score for each homework assignment
hw_avg <- colMeans(NA_to_zero(scores))

# Find which homework assignment had the lowest average score
lowest_hw <- hw_avg[which.min(hw_avg)]

# Return the homework assignment with the lowest score
lowest_hw

```

```

hw2
72.8

```

Q4. Which homework was most predictive of overall score (i.e. highest correlation with average grade score)?

```

# Return the homework assignment with the highest correlation to the overall average grade

# Count NA scores as a 0
mask <- scores
mask[is.na(mask)] <- 0

# Find the correlation between each homework assignment and the student's final grade
correlation <- apply(mask, 2, cor, y=gradebook)

# Return the homework assignment with the highest correlation to the overall average grade
highest_cor <- correlation[which.max(correlation)]
highest_cor

```

```

hw5
0.6325982

```