

Lab 6 Functions

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Example input 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)
```

Let's create a function to grade homework

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>”

```
#' Calculates average scores for a vector of homework scores.
#' Drops the lowest single score, NAs are counted as 0.
#'
#' @param d Numeric vector of homework scores
#'
#' @returns Average score
#' @export
#'
#' @examples
#' student <- c(100, NA, 90, 90, 90, 90, 97, 80)
#' grade(student)
#'
grade <- function(d) {
  d[is.na(d)] <- 0
  mean(d[-which.min(d)])
}
```

Let's test our function

```
grade(student1)
```

```
[1] 100
```

```
grade(student2)
```

```
[1] 91
```

```
grade(student3)
```

```
[1] 12.85714
```

Let's input the test grades of the example grade book and calculate their grades.

```
url <- "https://tinyurl.com/gradeinput"
book <- read.csv(url, row.names=1)
graded <- apply(book,1,grade)
graded
```

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?

```
names(graded)[which.max(graded)]
```

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

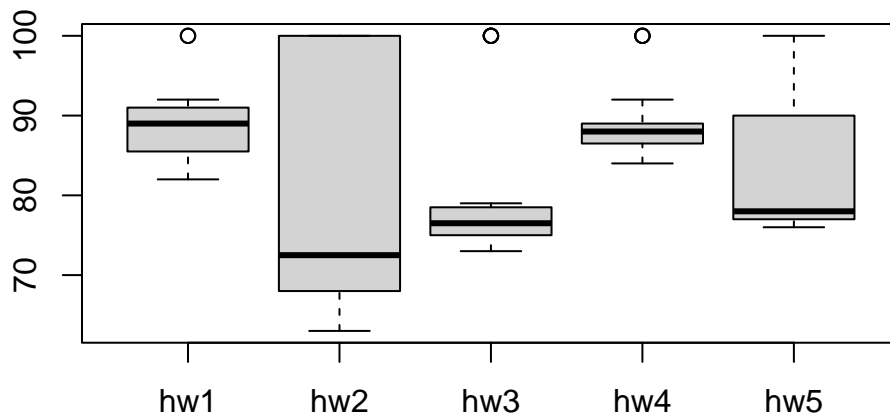
The student with the top score is student-18

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

```
assignments <- apply(book,2,median, na.rm=T)
names(assignments)[which.min(assignments)]
```

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

```
boxplot(book)
```



hw2 was the toughest assignment for the 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)?

```
book[is.na(book)] <- 0
cor.grade <- apply(book,2,cor, x=graded)
cor.grade
```

```
hw1      hw2      hw3      hw4      hw5
0.4250204 0.1767780 0.3042561 0.3810884 0.6325982
```

The homework that was most predictive of overall score was hw5.