

# R Functions Lab (Class 06)

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## Background

In this session you will work through the process of developing your own function for calculating average grades for fictional students in a fictional class.

The process will involve starting slowly with small defined input vectors (where you know what the answer should be). Then building up to work with more complex input vectors (with multiple missing elements).

Finally, you will turn your code into a function and apply it to a realistic [gradebook available online](#) to answer a set of common grading questions. Useful hints are provided in the next section.

## Hints

Once you have a working function for vector inputs (such as the *student1*, *student2*, and *student3* vectors below) you can use the `apply()` function to work with data frame inputs such as those obtained from `read.csv()`.

Additional functions you will want to explore include `mean()`, `is.na()`, `which.min()`, `which.max()`, `sum()`, and `cor()`. Remember, you can ask for help on any function by typing a question mark before the function name e.g. `?sum`.

We will walk through many of these steps together in class and in the video review screen-cast. However, attempting on your own before then is highly recommended and will be a big help for following our in class discussion and the the screen-cast review video. As always, if you have questions please ask in person or on Piazza. These are important skills and we want to support you in attaining them as best we can!

```
# 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)
```

## Your Tasks

- Create a new *RStudio project* for this class session. Note that you should save this inside the folder where you have been organizing your work to date for this class.
- Create a new *Quarto document* (or *Rmarkdown document* if you do not have Quarto available) for storing your work (i.e. notes and code for this session). You will *Render* this to a lab report for later submission on gradescope.
- Answer the following five questions. Note that **Q4** is optional but **Q5** (gradescope submission) is not.

**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]

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

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

**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]

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