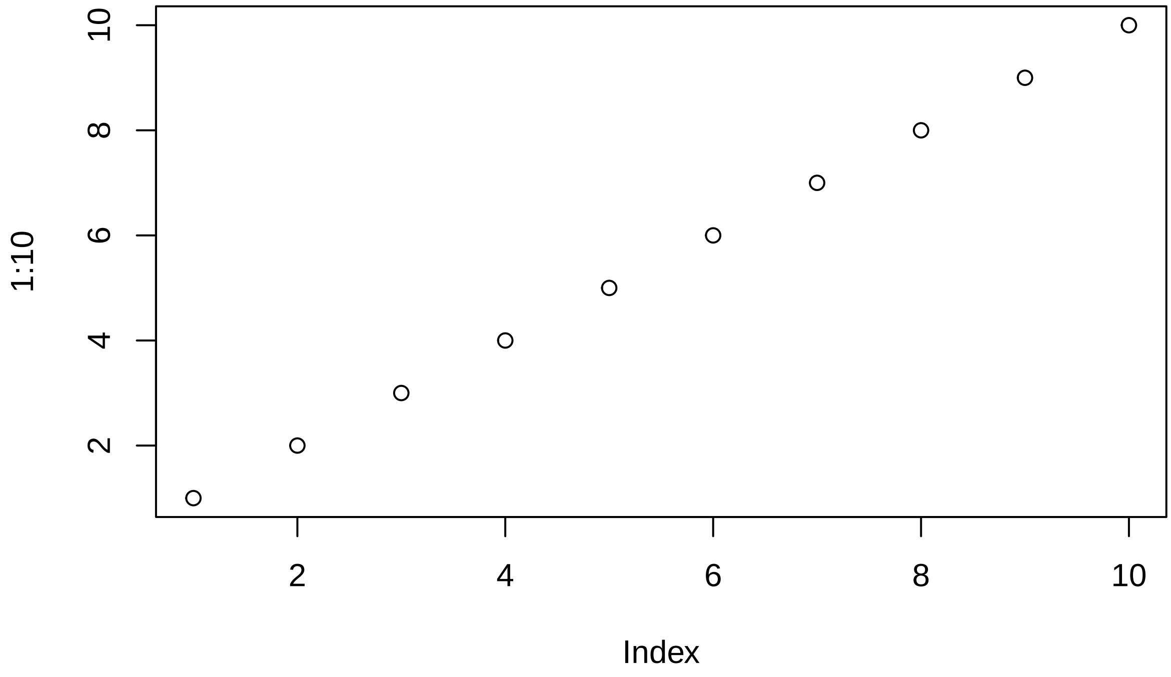
Class 6: R Function

Rui Huang (PID: A15606522)

10/14/2021

```
plot(1:10)
```



R function

Question for today: > **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 adquately 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 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)
```

stundent 1 average score.

```
mean(student1)
```

```
## [1] 98.75
```

drop the lowest score using **min()**

```
min(student1)
```

```
## [1] 90
```

which.min()

```
which.min(student1)
```

```
## [1] 8
```

```
student1[which.min(student1)]
```

```
## [1] 90
```

to drop the lowest score

```
student1[-which.min(student1)]
```

```
## [1] 100 100 100 100 100 100 100
```

```
mean(student1[-which.min(student1)])
```

```
## [1] 100
```

```
mean(student2[-which.min(student2)])
```

```
## [1] NA
```

needs to remove NA

```
mean(student2[-which.min(student2)], na.rm=TRUE)
```

```
## [1] 92.83333
```

replace NA with 0 for student2

```
is.na(student2)
```

```
## [1] FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
```

```
which(is.na(student2))
```

```
## [1] 2
```

```
student.prime <- student2
student.prime[which(is.na(student.prime))]=0
student.prime
```

```
## [1] 100   0  90  90  90  90  97  80
```

```
mean(student.prime[-which.min(student.prime)])
```

```
## [1] 91
```

check student3

```
student.prime <- student3
student.prime[which(is.na(student.prime))]=0
mean(student.prime[-which.min(student.prime)])
```

```
## [1] 12.85714
```

simplify

```
x <- student3
# map NA value to 0
x[which(is.na(x))]=0
# find the mean without the lowest value
mean(x[-which.min(x)])
```

```
## [1] 12.85714
```

```
grade <- function(x){
  # map NA value to 0
  x[which(is.na(x))]=0
  # find the mean without the lowest value
  mean(x[-which.min(x)])
}
```

```
grade(student2)
```

```
## [1] 91
```

now read the full gradebook csv file

```
scores <- read.csv("https://tinyurl.com/gradeinput", row.names=1)
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
## student-7   89 100  74  87 100
## student-8   89 100  76  86 100
## student-9   86 100  77  88  77
## student-10  89  72  79  NA  76
## student-11  82  66  78  84 100
## student-12 100  70  75  92 100
## student-13  89 100  76 100  80
## student-14  85 100  77  89  76
## student-15  85  65  76  89  NA
## student-16  92 100  74  89  77
## student-17  88  63 100  86  78
## student-18  91  NA 100  87 100
## student-19  91  68  75  86  79
## student-20  91  68  76  88  76
```

```
grade <- function(x){
  x <- as.numeric(x)
  # map NA value to 0
  x[which(is.na(x))]=0
  # find the mean without the lowest value
  mean(x[-which.min(x)])
}
```

```
ans=apply(scores,1,grade)
```

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

```
which.max(ans)
```

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

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

use apply() function over the columns by setting the margin=2 argument.

```
hw=apply(scores,2,mean, na.rm=TRUE)
print(hw)
```

```
##      hw1      hw2      hw3      hw4      hw5
## 89.00000 80.88889 80.80000 89.63158 83.42105
```

```
which.min(hw)
```

```
## hw3
##   3
```

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

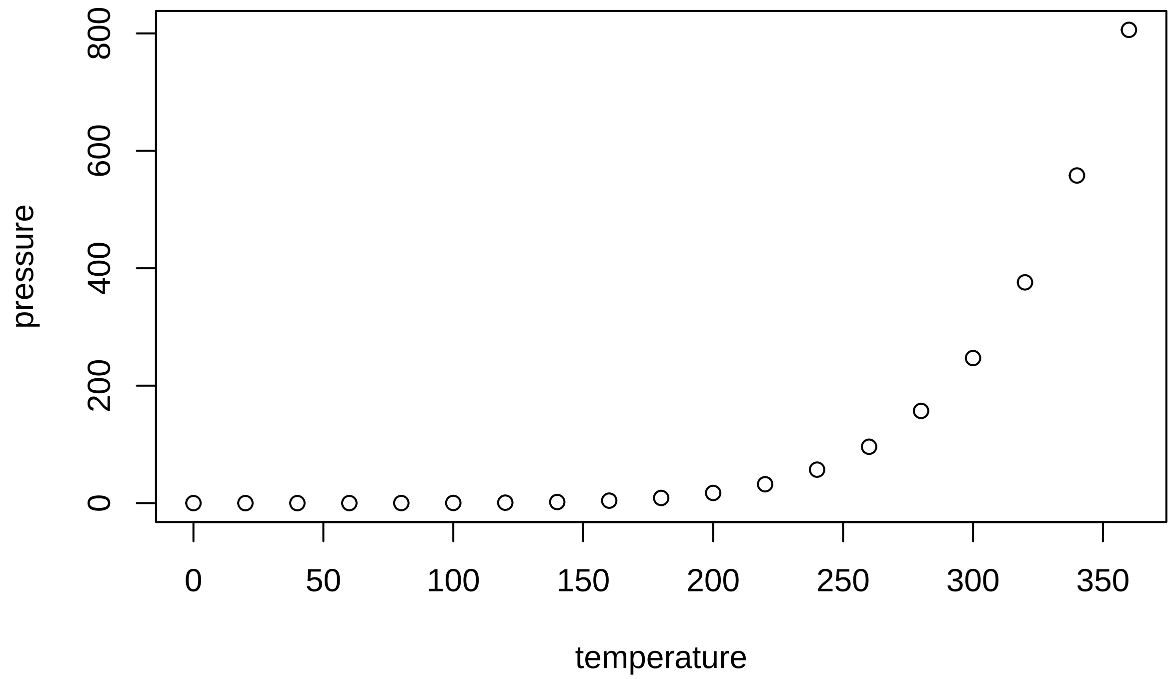
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed           dist       
##  Min.   : 4.0   Min.   :  2.00  
##  1st Qu.:12.0   1st Qu.: 26.00  
##  Median :15.0   Median : 36.00  
##  Mean   :15.4   Mean   : 42.98  
##  3rd Qu.:19.0   3rd Qu.: 56.00  
##  Max.   :25.0   Max.   :120.00  
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.