Class06

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10/15/2021

Rmarkdown Tutorial

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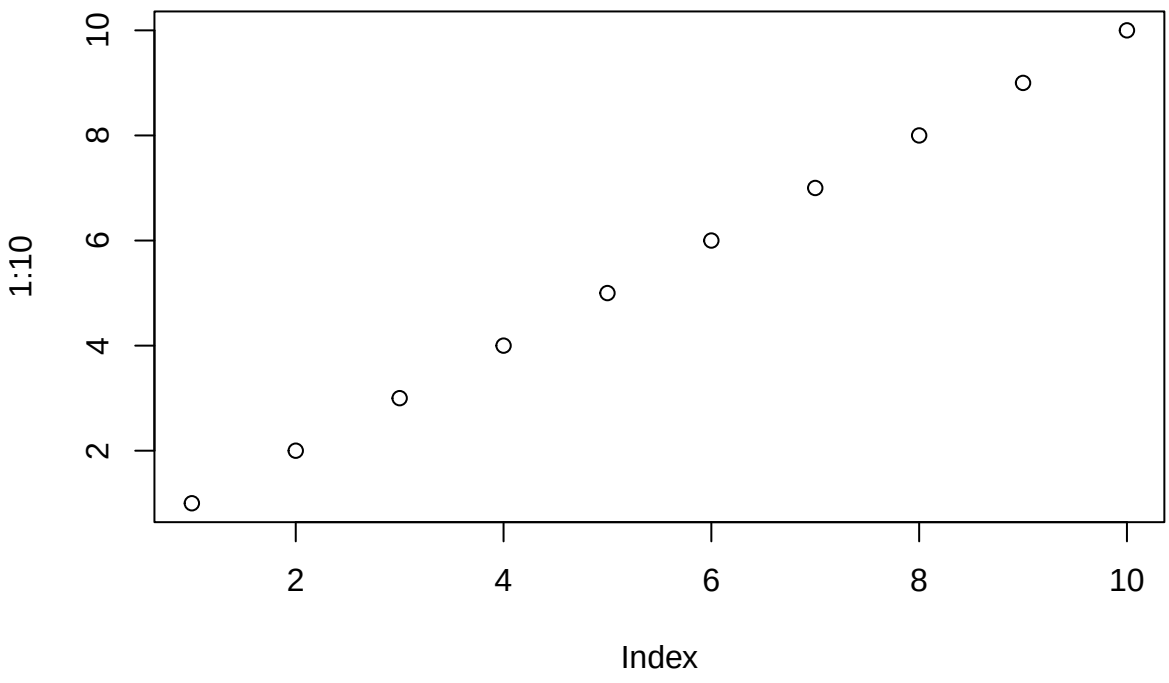
Code:

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



Function to Calculate Grade

```r
# input student grades
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)
```

Find the minimum score using **min()** and where its position in the vector using **which.min()**

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

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

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

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

Find the mean of the vector with the lowest score removed.

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

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

The above works if there are no NA's in the vector. The is.na() function returns a logical vector where the TRUE elements indicate and NA. A "!" means not.

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

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

Replace the NAs with zero nad insert previous code

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

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

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

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

Check to see if it works with student 3

```r
student3.prime <- student3
student3.prime[is.na(student3.prime)]=0
student3.prime
```

```
## [1] 90  0  0  0  0  0  0  0
```

```
mean(student3.prime[-which.min(student3.prime)])
```

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

What if one of the entries is as a string? Use **as.numeric()**

```
student4 <- c(100, NA, 90, "90", 90, 90, 97, 80)
x <- as.numeric(student4)
x[is.na(x)]=0
mean(x[-which.min(x)])
```

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

Write the function

```
grade <- function(x){
  x <- as.numeric(x)
  x[is.na(x)]=0
  mean(x[-which.min(x)])
}
```

Test Function

```
grade(student1)
```

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

Now grade a whole class

First we read the gradebook from the class

```
gradebook <- "https://tinyurl.com/gradeinput"
scores <- read.csv(gradebook, 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
```

Use the function **apply()** to grade all students with our **grade()** function

```
ans <- apply(scores, 1, grade)
```

Q2: Who is the top scoring student?

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

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

Q3: Which homework was the toughest?

```
hw <- apply(scores, 2, mean)
hw
```

```
##  hw1  hw2  hw3  hw4  hw5
## 89.0   NA 80.8   NA   NA
```

Remove the NAs

```
mask <- scores
mask[is.na(mask)]=0
mask
```

```
##            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   0  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   0  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   0
## student-16  92 100  74  89  77
## student-17  88  63 100  86  78
## student-18  91   0 100  87 100
## student-19  91  68  75  86  79
## student-20  91  68  76  88  76
```

Q3: Which homework was the toughest?

```
worst <- apply(mask, 2, mean)
worst
```

```
##   hw1   hw2   hw3   hw4   hw5
## 89.00 72.80 80.80 85.15 79.25
```

Q4: What score was the most predictive of overall score? Here we will use the **cor()** function

```
cor(mask$hw1, ans)
```

```
## [1] 0.4250204
```

```
cor(mask$hw2, ans)
```

```
## [1] 0.176778
```

```
cor(mask$hw3, ans)
```

```
## [1] 0.3042561
```

```
cor(mask$hw4, ans)
```

```
## [1] 0.3810884
```

```
cor(mask$hw5, ans)
```

```
## [1] 0.6325982
```

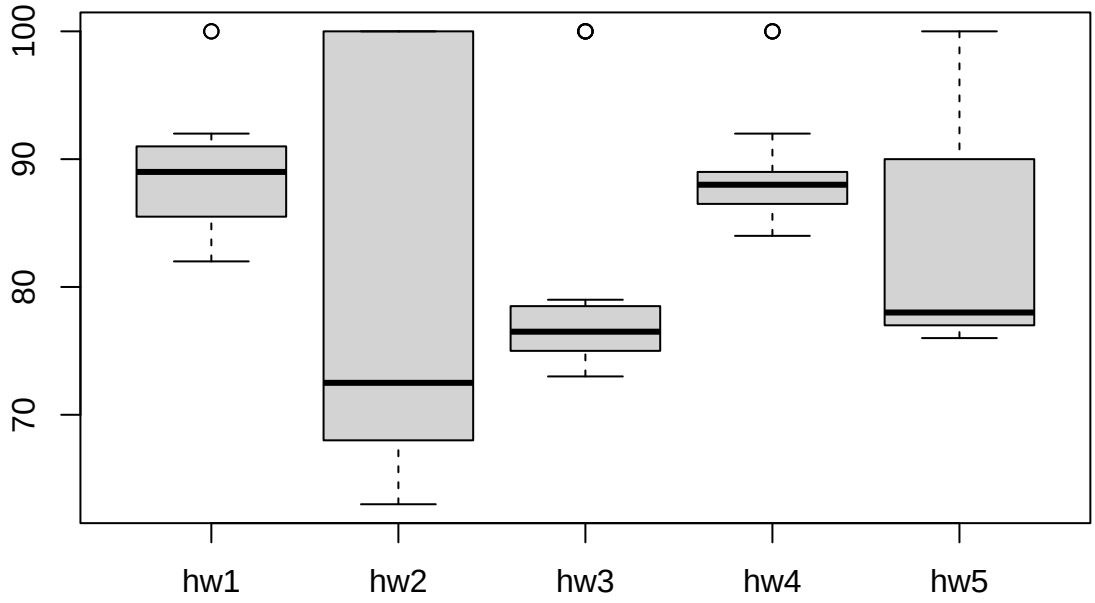
Call for **cor()** function for every homework using the **apply()** function. Hwk 5 is the most predictive.

```
apply(mask,2,cor,ans)
```

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

Make a boxplot

```
boxplot(scores)
```


100
90
80
70
hw1
hw2
hw3
hw4
hw5