

### ASSIGNMENT 3:

Apply basic statistical operations, measure of location (Arithmetic mean, harmonic mean,

geometric mean, median, mode).

Use built in functions and write user defined functions for all. Compare the results of user defined function with built in function. Use built-in Indian data set

```
> data()
```

This command shows all the built in data sets in RStudio

PlantGrowth is a built-in data set in R and all operations have been performed on it

```
> head(PlantGrowth)
```

```
  weight group
```

```
1  4.17  ctrl
```

```
2  5.58  ctrl
```

```
3  5.18  ctrl
```

```
4  6.11  ctrl
```

```
5  4.50  ctrl
```

```
6  4.61  ctrl
```

```
> PlantGrowth
```

```
  weight group
```

```
1  4.17  ctrl
```

```
2  5.58  ctrl
```

```
3  5.18  ctrl
```

```
4  6.11  ctrl
```

```
5  4.50  ctrl
```

```
6  4.61  ctrl
```

7	5.17	ctrl
8	4.53	ctrl
9	5.33	ctrl
10	5.14	ctrl
11	4.81	trt1
12	4.17	trt1
13	4.41	trt1
14	3.59	trt1
15	5.87	trt1
16	3.83	trt1
17	6.03	trt1
18	4.89	trt1
19	4.32	trt1
20	4.69	trt1
21	6.31	trt2
22	5.12	trt2
23	5.54	trt2
24	5.50	trt2
25	5.37	trt2
26	5.29	trt2
27	4.92	trt2
28	6.15	trt2
29	5.80	trt2
30	5.26	trt2

### **Arithmetic Mean**

**Built-in function-mean()**

```
> mean(PlantGrowth$weight)
```

```
[1] 5.073
```

### User defined function

```
> Mean=function(x){
```

```
+ sumu=sum(x)
```

```
+ L=length(x)
```

```
+ M=sumu/L
```

```
+ print(M)
```

```
+ };
```

```
> Mean(PlantGrowth$weight)
```

```
[1] 5.073
```

### Harmonic Mean

**Built-in function:** Harmonic mean of the column in R is calculated using `harmonic.mean()` function of the `psych` package.

```
install.packages("psych");
```

```
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.1/psych_2.1.9.zip'
```

```
Content type 'application/zip' length 4244266 bytes (4.0 MB)
```

```
downloaded 4.0 MB
```

```
package 'psych' successfully unpacked and MD5 sums checked
```

```
>library(psych)
```

```
> harmonic.mean(PlantGrowth$weight)
```

```
[1] 4.974726
```

### User Defined Function

```
> HarmonicMean=function(x){
```

```
+ N=length(x)
```

```
+ inverseOfX=x^(-1)
```

```
+ sumOfInverse=sum(inverseOfX)
```

```

+ hm=sumOfInverse/N
+ hm=N/sumOfInverse
+ print("Harmonic Mean")
+ print(hm)
+ };
> HarmonicMean(PlantGrowth$weight)
[1] "Harmonic Mean"
[1] 4.974726

```

## **Geometric Mean**

### **Built-in method**

**Syntax for calculating geometric mean:**

**$\exp(\text{mean}(\log(x)))$  where  $x$  is a vector**

```

> exp(mean(log(PlantGrowth$weight)))
[1] 5.02463

```

### **User Defined function**

```

> geometricMean=function(x){
+ product=prod(x)
+ N=length(x)
+ gm=product^(1/N)
+ print(gm)
+ };
> geometricMean(PlantGrowth$weight)
[1] 5.02463

```

## **Median**

### **Built-in method**

```

> median(PlantGrowth$weight)

```

```
[1] 5.155
```

### **User defined method**

```
> mymedian <- function(lst) {  
+   n <- length(lst)  
+   s <- sort(lst)  
+   ifelse(n%%2==1,s[(n+1)/2],mean(s[n/2+0:1]))  
+ }  
  
> mymedian(PlantGrowth$weight)
```

```
[1] 5.155
```

### **Mode**

There is no direct command in R to find the mode. If we create a table, it will show, which height is repeated most number of times.

```
> a=table(PlantGrowth$weight)  
> sort(a,decreasing = TRUE)[1]
```

```
4.17
```

```
2
```

### **User defined method**

```
> mode = function(x){  
+   return(sort(-table(x))[1])  
+ }  
  
> mode(PlantGrowth$weight)
```

```
4.17
```

```
-2
```