MAT2001 – Statistics for Engineers - ELA (R Code Studio), Winter Semester 2020-2021

Lab Assessment - II

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Q1) Write R code to compute mean, median, mode and all measures of dispersions for the following frequency distribution:

Expenditure	0-100	100-200	200-300	300-400	400-500	500-600	600-700
No. of families	10	6	9	16	4	24	27

Also calculate (i) Mean Deviation about mean (ii) Mean Deviation about median (iii) Mean Deviation about mode.

A: Code is as follows:

1) Mean, Median & Mode

```
#mean
h = 100
x = seq(50,650,h)
f = c(10,6,9,16,4,24,27)
N = sum(f)
Mean = sum(x*f)/N
Mean
#median
cf = cumsum(f)
mc = min(which(cf>=N/2))
mcf=f[mc]
c=cf[mc-1]
l=x[mc]-h/2
Median=l+(h/mcf)*((N/2-c))
Median
#mode
mo=which(f==max(f))
mo
```

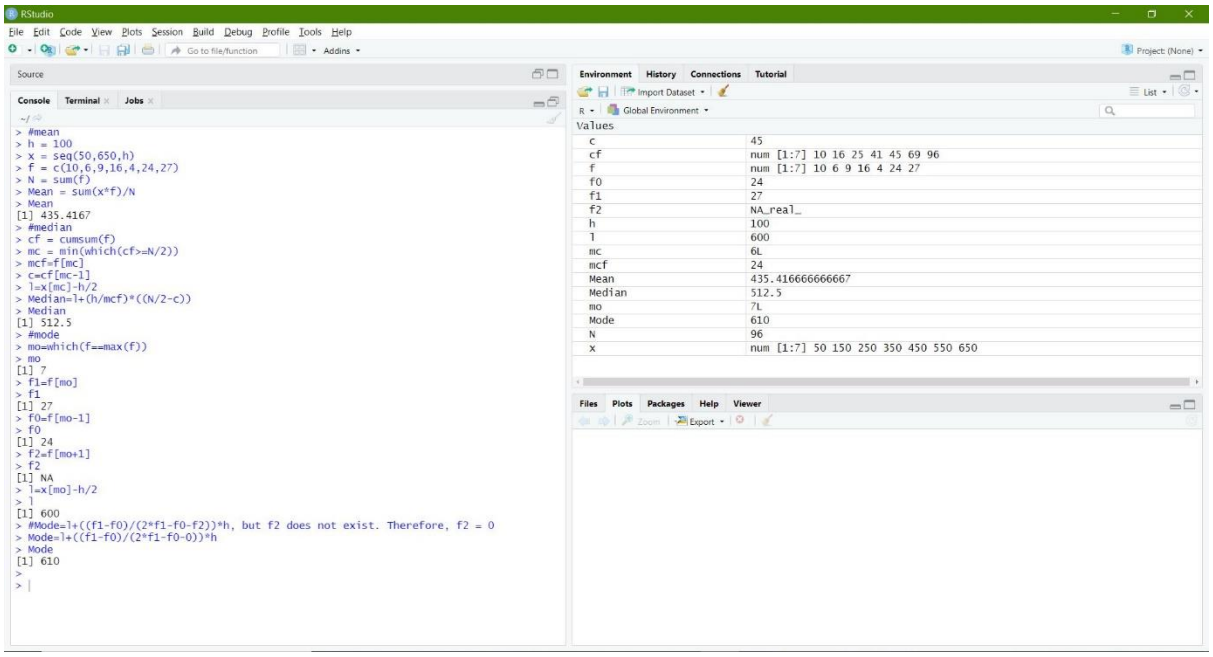
```
f1=f[mo]

f1

f0=f[mo-1]

f0

f2=f[mo+1]

f2

l=x[mo]-h/2

l

#Mode=l+((f1-f0)/(2*f1-f0-f2))*h, but f2 does not exist. Therefore, f2 = 0

Mode=l+((f1-f0)/(2*f1-f0-0))*h

Mode
```

Output (via Command Window):

```
> #mean
> h = 100
> x = seq(50,650,h)
> f = c(10,6,9,16,4,24,27)
> N = sum(f)
> Mean = sum(x*f)/N
> Mean
[1] 435.4167
> #median
> cf = cumsum(f)
> mc = min(which(cf>=N/2))
> mcf=f[mc]
> c=cf[mc-1]
> l=x[mc]-h/2
> Median=l+(h/mcf)*((N/2-c))
> Median
[1] 512.5
> #mode
> mo=which(f==max(f))
> mo
[1] 7
> f1=f[mo]
> f1
[1] 27
> f0=f[mo-1]
> f0
[1] 24
```

```
> f2=f[mo+1]
> f2
[1] NA
> l=x[mo]-h/2
> l
[1] 600
> #Mode=l+((f1-f0)/(2*f1-f0-f2))*h, but f2 does not exist. Therefore, f2 = 0
> Mode=l+((f1-f0)/(2*f1-f0-0))*h
> Mode
[1] 610
```

Implementation on R Studio Code (via Command Window):



2) Mean Deviation about Mean (M1), about Median (M2) and Mode (M3)

#mean

h = 100

x = seq(50,650,h)

f = c(10,6,9,16,4,24,27)

N = sum(f)

Mean = sum(x*f)/N

Mean

#median

cf = cumsum(f)

```
mc = min(which(cf>=N/2))
mcf=f[mc]
c=cf[mc-1]
l=x[mc]-h/2
Median=l+(h/mcf)*((N/2-c))
Median
#mode
mo=which(f==max(f))
mo
f1=f[mo]
f1
f0=f[mo-1]
f0
f2=f[mo+1]
f2
l=x[mo]-h/2
l
#Mode=l+((f1-f0)/(2*f1-f0-f2))*h, but f2 does not exist. Therefore, f2 = 0
Mode=l+((f1-f0)/(2*f1-f0-0))*h
Mode
#MD about mean = ∑f|x−Mean|/N
MD1 = sum(f*abs(x - Mean))/sum(f)
MD1
#MD about mean = ∑f|x−Mean|/N
MD2 = sum(f*abs(x - Median))/sum(f)
MD2
#MD about mean = ∑f|x−Mean|/N
MD3 = sum(f*abs(x - Mode))/sum(f)
MD3
```

Output (via Command Window):

```
> #mean
```

```
> h = 100
> x = seq(50,650,h)
> f = c(10,6,9,16,4,24,27)
> N = sum(f)
> Mean = sum(x*f)/N
> Mean
[1] 435.4167
> #median
> cf = cumsum(f)
> mc = min(which(cf>=N/2))
> mcf=f[mc]
> c=cf[mc-1]
> l=x[mc]-h/2
> Median=l+(h/mcf)*((N/2-c))
> Median
[1] 512.5
> #mode
> mo=which(f==max(f))
> mo
[1] 7
> f1=f[mo]
> f1
[1] 27
> f0=f[mo-1]
> f0
[1] 24
> f2=f[mo+1]
> f2
[1] NA
> l=x[mo]-h/2
> l
```

[1] 600

> #Mode=l+((f1-f0)/(2*f1-f0-f2))*h, but f2 does not exist. Therefore, f2 = 0

> Mode=l+((f1-f0)/(2*f1-f0-0))*h

> Mode

[1] 610

> #MD about mean = ∑f|x−Mean|/N

> MD1 = sum(f*abs(x - Mean))/sum(f)

> MD1

[1] 179.2101

> #MD about mean = ∑f|x−Mean|/N

> MD2 = sum(f*abs(x - Median))/sum(f)

> MD2

[1] 173.1771

> #MD about mean = ∑f|x−Mean|/N

> MD3 = sum(f*abs(x - Mode))/sum(f)

> MD3

[1] 197.0833

Implementation on R Studio Code (via Command Window):