MAT 2001

Statistics

Embedded Lab e-Record

Assessment – 1

L1+L2

WINTER SEMESTER 2019-20

Exp 1: Measures of Central Tendency

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submitted by

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Question 1

Problem:

From the following data of the marks obtained by 60 students of a class, calculate the arithmetic mean and median of the distribution.

Marks	20	30	40	50	60	70
No. of students	8	12	20	10	6	4

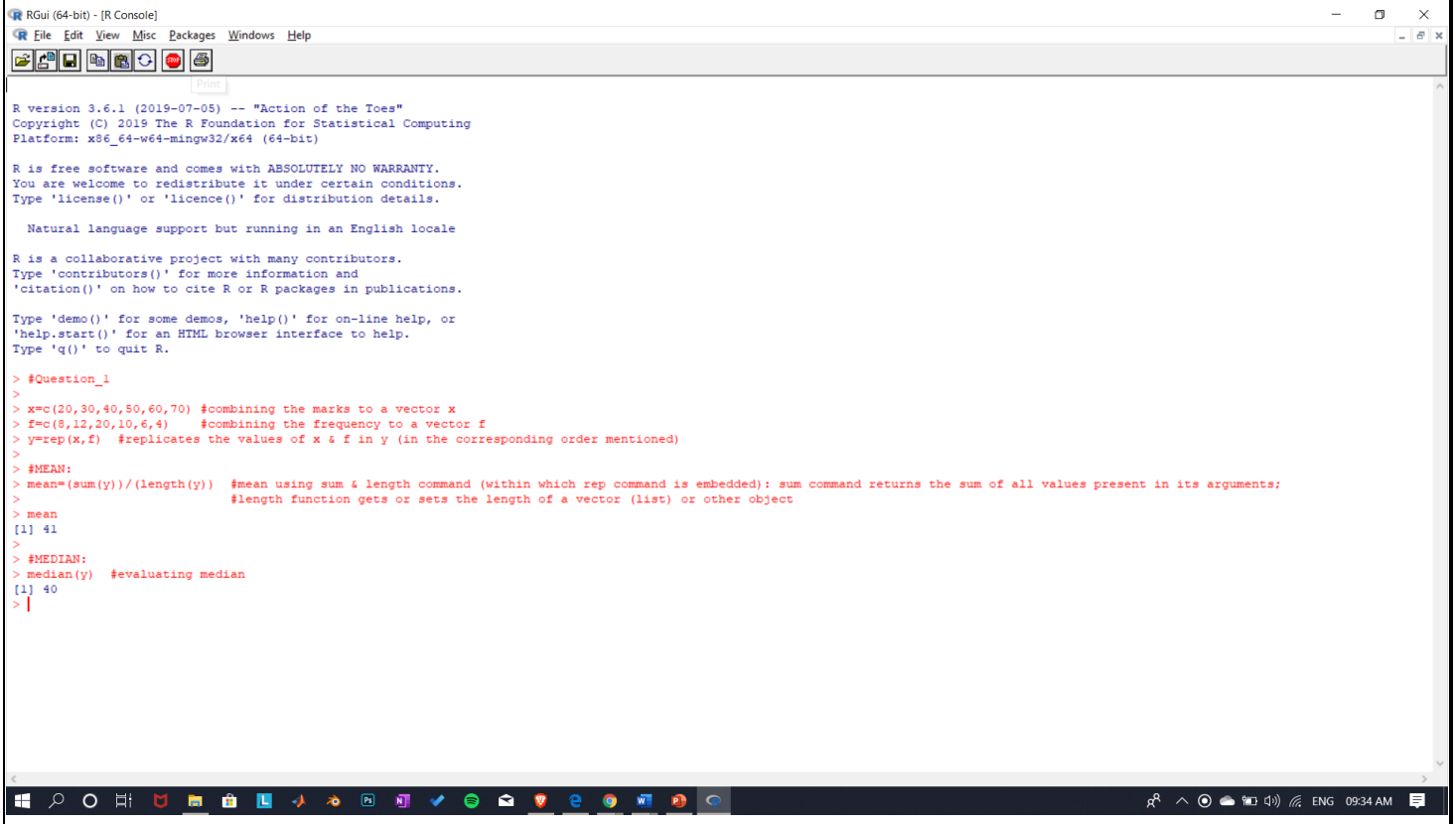
Code & Input in R console:

```
> #Question_1
>
> x=c(20,30,40,50,60,70) #combining the marks to a vector x
> f=c(8,12,20,10,6,4)    #combining the frequency to a vector f
> y=rep(x,f)   #replicates the values of x & f in y (in the
corresponding order mentioned)
>
> #MEAN:
> mean=(sum(y))/(length(y))   #mean using sum & length command
(within which rep command is embedded inside y): sum command
returns the sum of all values present in its arguments; length
function gets or sets the length of a vector (list) or other object
> mean
[1] 41
>
> #MEDIAN:
> median(y) #evaluating median
[1] 40
```

Output:

```
> mean: 41
> median: 40
```

Screenshot of Code:



Question 2

Problem:

From the following data of weight of 122 persons, determine the mean, median & modal weight.

Weight (in lbs)	100-110	110-120	120-130	130-140	140-150	150-160	160-170	170-180
No. of persons	4	6	20	32	33	17	8	2

Code & Input in R console:

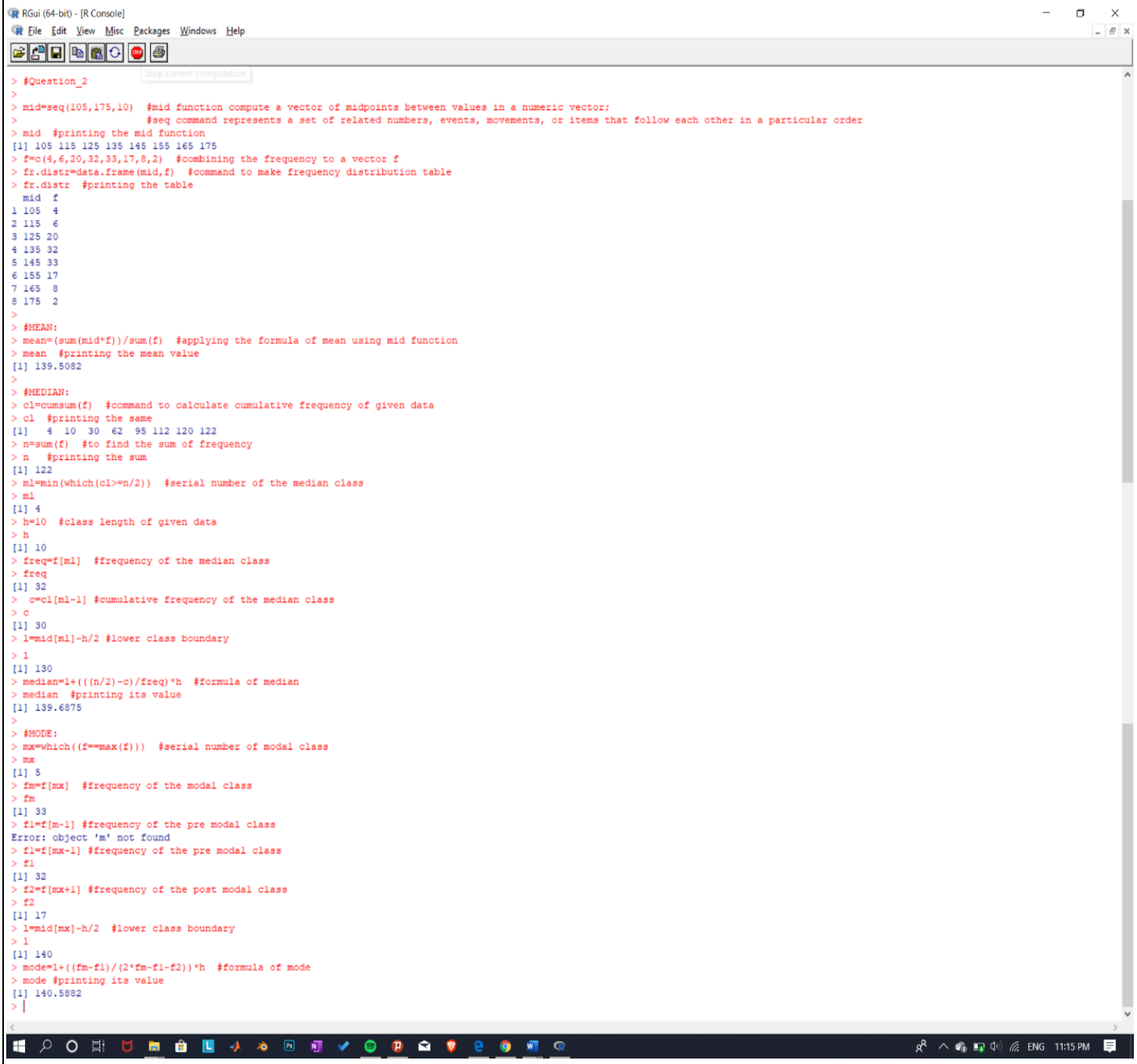
```
> #Question_2
>
> mid=seq(105,175,10)      #mid function compute a vector of midpoints between values in a numeric vector;
>                          #seq command represents a set of related numbers, events, movements, or items that follow each other in a particular order
> mid  #printing the mid function
[1] 105 115 125 135 145 155 165 175
> f=c(4,6,20,32,33,17,8,2)  #combining the frequency to a vector f
>   fr.distr=data.frame(mid,f)      #command to make frequency distribution table
> fr.distr  #printing the table
  mid  f
1 105  4
2 115  6
3 125 20
4 135 32
5 145 33
6 155 17
7 165  8
8 175  2
>
> #MEAN:
> mean=(sum(mid*f))/sum(f)   #applying the formula of mean using mid function
> mean  #printing the mean value
[1] 139.5082
>
```

```
> #MEDIAN:
> cl=cumsum(f)  #command to calculate cumulative frequency of given
data
> cl  #printing the same
[1]   4  10  30  62  95 112 120 122
> n=sum(f)  #to find the sum of frequency
> n   #printing the sum
[1] 122
> ml=min(which(cl>=n/2))  #serial number of the median class
> ml
[1] 4
> h=10  #class length of given data
> h
[1] 10
> freq=f[ml]  #frequency of the median class
> freq
[1] 32
>  c=cl[ml-1] #cumulative frequency of the median class
> c
[1] 30
> l=mid[ml]-h/2 #lower class boundary
> l
[1] 130
> median=l+(((n/2)-c)/freq)*h  #formula of median
> median  #printing its value
[1] 139.6875
>
> #MODE:
> mx=which((f==max(f)))  #serial number of modal class
> mx
[1] 5
> fm=f[mx]  #frequency of the modal class
> fm
[1] 33
> f1=f[mx-1] #frequency of the pre modal class
> f1
[1] 32
> f2=f[mx+1] #frequency of the post modal class
> f2
[1] 17
> l=mid[mx]-h/2  #lower class boundary
> l
[1] 140
> mode=l+((fm-f1)/(2*fm-f1-f2))*h  #formula of mode
> mode #printing its value
[1] 140.5882
```

Output:

```
> mean: 139.5082
> median: 139.6875
> mode: 140.5882
```

Screenshot of Code:



Question 3

Problem:

From the following data of wages (in Rupees) of workers, compute:

23460, 34850, 43956, 34535, 23784, 23785, 23456, 43569, 23758, 34535, 43864, 23679, 34535, 43762, 34873, 23764, 23784, 86345, 34850, 47645

(a) Find the mean and median wage.
(b) Find modal wage of all workers.
(c) Find median wage of workers under 25000 and above 35000.

Frequency distribution table:

Wages	No. of workers
23460	1
34850	2
43956	1
34535	3
23784	2
23785	1
23456	1
43569	1
23758	1
43864	1
23679	1
43762	1
34873	1
23764	1
86345	1
47645	1

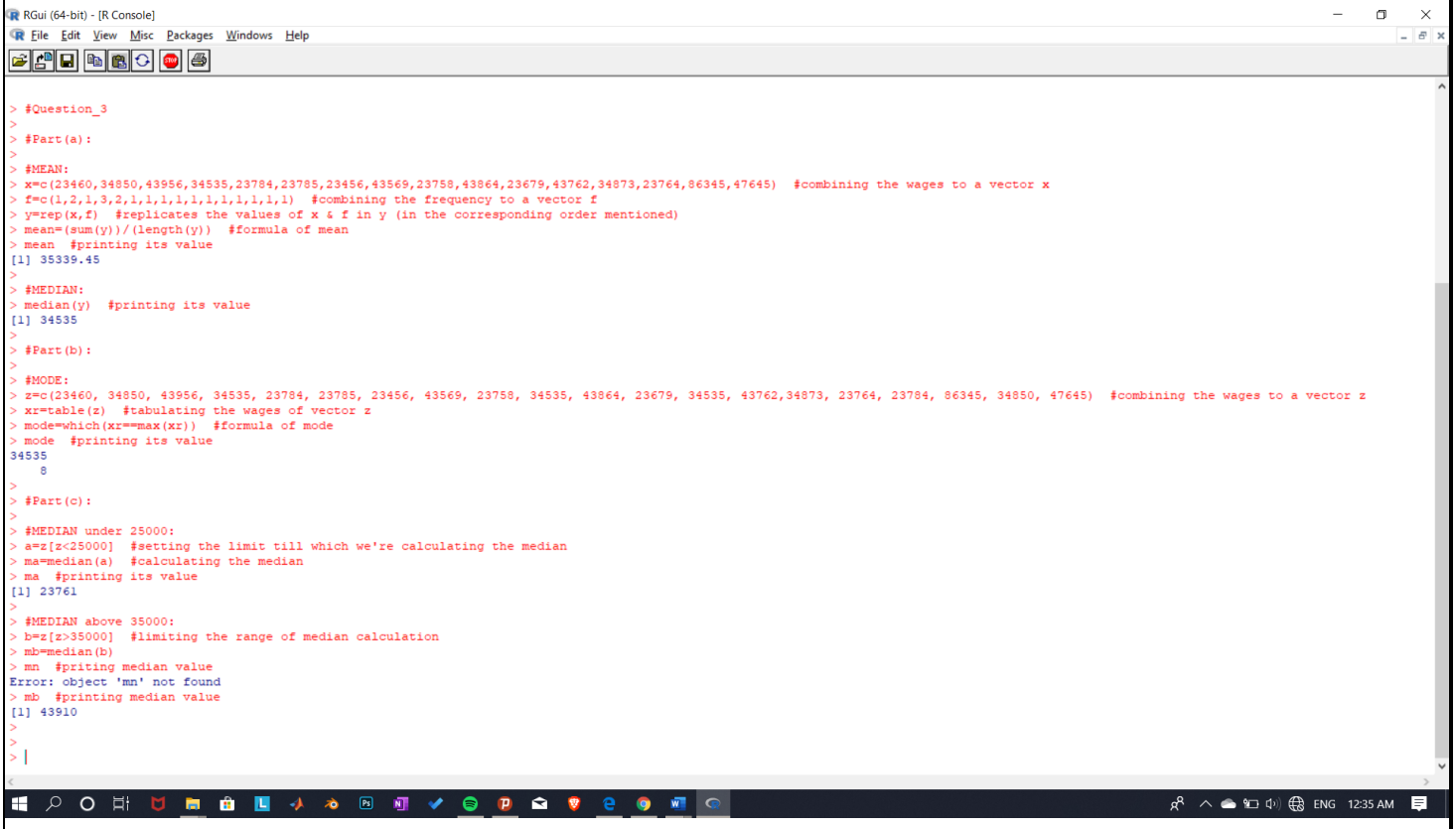
Code & Input in R console:

```
> #Question_3
>
> #Part(a):
>
> #MEAN:
>
x=c(23460,34850,43956,34535,23784,23785,23456,43569,23758,43864,2
3679,43762,34873,23764,86345,47645)   #combining the wages to a
vector x
> f=c(1,2,1,3,2,1,1,1,1,1,1,1,1,1,1)   #combining the frequency
to a vector f
> y=rep(x,f)   #replicates the values of x & f in y (in the
corresponding order mentioned)
> mean=(sum(y))/(length(y))  #formula of mean
> mean  #printing its value
[1] 35339.45
>
> #MEDIAN:
> median(y)  #printing its value
[1] 34535
>
> #Part(b):
>
> #MODE:
> z=c(23460, 34850, 43956, 34535, 23784, 23785, 23456, 43569,
23758, 34535, 43864, 23679, 34535, 43762,34873, 23764, 23784,
86345, 34850, 47645)  #combining the wages to a vector z
> xr=table(z)  #tabulating the wages of vector z
> mode=which(xr==max(xr))  #formula of mode
> mode  #printing its value
34535
    8
>
> #Part(c):
>
> #MEDIAN under 25000:
> a=z[z<25000]  #setting the limit till which we're calculating
the median
> ma=median(a)  #calculating the median
> ma  #printing its value
[1] 23761
>
> #MEDIAN above 35000:
> b=z[z>35000]  #limiting the range of median calculation
> mb=median(b)
> mb  #printing median value
[1] 43910
```

Output:

```
(a) > mean: 35339.45
    > median: 34535
(b) > mode: 34535
                8
(c) > median under 25000: 23761
    > median above 35000: 43910
```

Screenshot of Code:



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