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

By: Jonathan Rufus Samuel (20BCT0332) Date: 21.6.2021

Q1) Write R code to compute mean, median, mode, variance, standard deviation and coefficient of variation for the following frequency distribution:

Expenditure	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of	3	61	132	153	140	51	2
families							

Procedure & Result:

```
MATZOOI - LAB FAT EXAM
BY: JONATHAN RUFUS SAMUEL (20BCT0332) DATE: 21.6. 2021
 SET - A TIME: 10 am - 11:15 am
    Calculate all the required values using standard formulas.
Q1) Procedure:
     then proceed to display the values.
     Mean: \frac{2dx}{2t}; Medino: \frac{1}{2} \frac{h}{(d.cd)} \frac{N}{2-c}
      Mode: l + \frac{(30-31)}{(2*30-31-32)*h} Vorunce * \frac{2(2-2)^2}{23}
       Standard Deviation = squit variance) = 502 = 0
       Coefficient of Variations => CV = SD / Mean
   (ode:
    # Mears
    x = seq (25, 85, h)
    8 = C (3,61, 132, 153, 140,51,2)
     N = Sum(+)
     Maare = swm (x+4) IN
     Mean
     # Mediano
     4 = curmsum (+)
     mc: min (which (ct >= 1/2))
     mcf = f[mc]
     c= cd [mc-1]
     l = x[mc - h/2 7
                                    P. T. O
```

```
Median = l + (h/med) * (N/2-c)
  Median
  # Mode
    mo = which ( == max (+))
   [om] + :06
    f1 = 4 [mo-1]
   95 = 9 [wo+1]
    l = x [mo] - h/2
    mode = l+ ((+0-41) 1(2*40-41-42)) * h
    mode
  # Variance
   M = C (z - Maun)
    Var = ((swm (x-H))^2) 1 N
    Van
  # Standard Devication
    SD: sont (var)
  # Cofficerat of Variation
     CV = SD ! Means
     CV
.: Resut: Mean. Median, Made, Variaince, Standard Devication and
  Coafficient of Variation of given data is found.
```

Output:

A: Code is as follows:

```
#mean
h = 10
x = seq(25,85,h)
f = c(3,61,132,153,140,51,2)
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=I+(h/mcf)*((N/2-c))
Median
#mode
mo=which(f==max(f))
f0=f[mo]
f1=f[mo-1]
f2=f[mo+1]
l=x[mo]-h/2
mode = I+((f0-f1)/(2*f0-f1-f2))*h
mode
#Variance
M = c(x-Mean)
Μ
Var = ((sum(x-M))^2)/N
Var
#Standard Deviation
SD = sqrt(Var)
```

SD

#Co-efficient of Variation

CV = SD/Mean

 CV

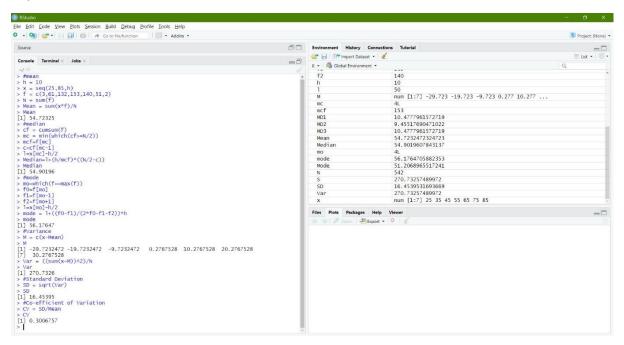
Output (via Command Window):

- >#mean
- > h = 10
- > x = seq(25,85,h)
- > f = c(3,61,132,153,140,51,2)
- > N = sum(f)
- > Mean = sum(x*f)/N
- > Mean
- [1] 54.72325
- > #median
- > cf = cumsum(f)
- > mc = min(which(cf>=N/2))
- > mcf=f[mc]
- > c=cf[mc-1]
- > l=x[mc]-h/2
- > Median=I+(h/mcf)*((N/2-c))
- > Median
- [1] 54.90196
- >#mode
- > mo=which(f==max(f))
- > f0=f[mo]
- > f1=f[mo-1]
- > f2=f[mo+1]
- > l=x[mo]-h/2
- > mode = I+((f0-f1)/(2*f0-f1-f2))*h
- > mode
- [1] 56.17647
- > #Variance
- > M = c(x-Mean)
- > M
- [1] -29.7232472 -19.7232472 -9.7232472 0.2767528 10.2767528 20.2767528
- [7] 30.2767528
- $> Var = ((sum(x-M))^2)/N$
- > Var
- [1] 270.7326
- > #Standard Deviation
- > SD = sqrt(Var)
- > SD
- [1] 16.45395

- > #Co-efficient of Variation
- > CV = SD/Mean
- > CV

[1] 0.3006757

Implementation on R Studio Code (via Command Window):



Global Variables:

```
R - Global Environment -
                                                                                   Q
Values
                           196
  C
                           num [1:7] 3 64 196 349 489 540 542
  cf
  CV
                           0.30067574571129
                           num [1:7] 3 61 132 153 140 51 2
  f0
                           153
  f1
                           132
  f2
                           140
                           10
  h
  1
                           50
                           num [1:7] -29.723 -19.723 -9.723 0.277 10.277 ...
  M
                           4L
  mc
  mcf
                           153
                           54.7232472324723
  Mean
                           54.9019607843137
  Median
  mo
                           4L
  mode
                           56.1764705882353
                           542
  N
                           16.4539531693669
  SD
                           270.73257489972
  Var
                           num [1:7] 25 35 45 55 65 75 85
  X
```

Q2) A completely randomized design experiment with 10 plots and 3 treatments (A,B and C) gave the following results:

A:	5	7	3	1
B:	4	4	7	
C:	3	5	1	

Write down the R programming code to analyse the results for treatment effects with 95% levels of confidence.

Procedure & Result:

```
Q2) Procedure
   Store Values of given data within A. B and C respectively.
    i.e A = {5,7,3,1}
         B: 54.4.73
          C = {3,5,13
    As it is 95% Level of Confidence for above testing, mote
  -that alpha = 0.05 1. e100-95% = 5% = 0.05
  Gret Summary of above data as shown in code below.
 Let Hyothesis HO = Treatment effects > 95%. Level of Confidence
          85 HI = Treatment effects > 95%. Level of Confidence
  The Pre value is found to be 0.566 (under Pre (>F))
           :. PAS. 0.566 is 957. Level of Confidency,
               140 is accepted & H) is rejected
 Code:
    # Q 2
     A = c (5,7,3,1)
    B: c(4,4,7)
     C = c(3,5,1)
     Data = c (A,B,C)
     Type = c (nep ("Type1", longth (A)), nep ("Type2", longth (B)), nep ("Type3";
        length (c))
      Type
      ANOVA1 = aor (Data~ Type)
      Summary (ANOVAI)
      # alpha = 0.05
```



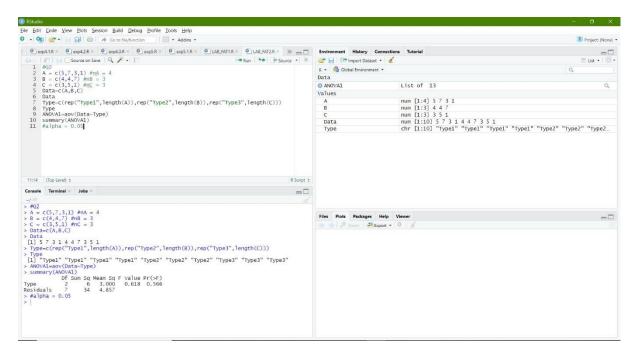
Output:

A: Code is as follows:

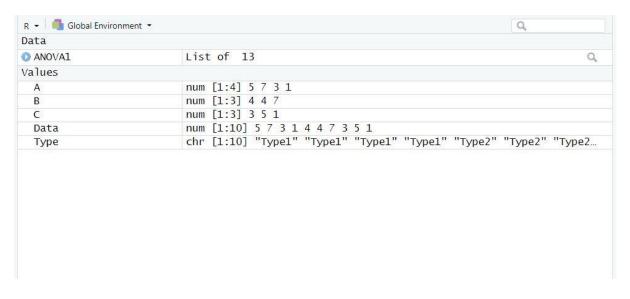
#Q2

```
A = c(5,7,3,1) #nA = 4
B = c(4,4,7) #nB = 3
C = c(3,5,1) #nC = 3
Data=c(A,B,C)
Data
Type=c(rep("Type1",length(A)),rep("Type2",length(B)),rep("Type3",length(C)))
Type
ANOVA1=aov(Data~Type)
summary(ANOVA1)
#alpha = 0.05
Output (via Command Window):
> #Q2
> A = c(5,7,3,1) #nA = 4
> B = c(4,4,7) #nB = 3
> C = c(3,5,1) #nC = 3
> Data=c(A,B,C)
> Data
[1] 5 7 3 1 4 4 7 3 5 1
> Type=c(rep("Type1",length(A)),rep("Type2",length(B)),rep("Type3",length(C)))
> Type
[1] "Type1" "Type1" "Type1" "Type1" "Type2" "Type2" "Type2" "Type3" "Type3" "Type3"
> ANOVA1=aov(Data~Type)
> summary(ANOVA1)
      Df Sum Sq Mean Sq F value Pr(>F)
Type
         2 6 3.000 0.618 0.566
Residuals 7 34 4.857
> #alpha = 0.05
```

Implementation on R Studio Code (via Command Window):



Global Variables:



Q3) Viva-Voce/Quiz: ANSWERS:

- 1) t = M*(matrix(c(),nrow=3,ncol=2,byrow=TRUE)
- 2) Mean = sum(seq(25,82,1))/(82-25)
- 3) Option (b) 2
- 4) Option (b) not be extracted
- 5) Option (c) storage.mode