DWDM R PROGRAMMING-PRACTICALS

1.List of Programs:

1The intervals and corresponding frequencies are as follows. age frequency

1-5. 200

5-15 450

15-20 300

20-50 1500

50-80 700

80-110 44

Compute an approximate median value for the data

CODING-

```
intervals <- c("1-5", "5-15", "15-20", "20-50", "50-80", "80-110")

frequencies <- c(200, 450, 300, 1500, 700, 44)

cumulative_freq <- cumsum(frequencies)

median_interval_index <- which(cumulative_freq >= sum(frequencies)/2)[1]

lower_bound <- as.numeric(strsplit(intervals[median_interval_index], "-")[[1]][1])

upper_bound <- as.numeric(strsplit(intervals[median_interval_index], "-")[[1]][2])

cumulative_freq_before <- cumulative_freq[median_interval_index] -
frequencies[median_interval_index]

frequency_median <- frequencies[median_interval_index]

width <- upper_bound - lower_bound

median_value <- lower_bound + ((sum(frequencies)/2 - cumulative_freq_before) /
frequency_median) * width

print(paste("Approximate Median Value:", median_value))
```

OUTPUT-

```
[1] "Approximate Median Value: 32.94"
```

2. Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in increasing order) 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.

(a) What is the mean of the data? What is the median?

(b) What is the mode of the data? Comment on the data's modality (i.e., bimodal, trimodal, etc.).

(c) What is the midrange of the data?

(d) Can you find (roughly) the first quartile (Q1) and the third quartile (Q3) of the data?

Coding:

#2a

```
 x<-c(13,15,16,16,19,20,20,21,22,22,25,25,25,25,30,33,33,35,35,35,35,36,40,45,46,52,70)
#mean
mean(x)
#median
median(x)
```

output:

```
mean(x)
[1] 29.96296
> #median
> median(x)
[1] 25
```

CODING FOR 2b-

#2b

```
 #mode
MultipleModes <- function(x) {
  uniqx <- unique(x)
  freq_table <- tabulate(match(x, uniqx))
  modes <- uniqx[freq_table == max(freq_table)]
  modes
}
```

```
age_values <- c(13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70)

multiple_modes <- MultipleModes(age_values)

print(multiple_modes)
```

output:

25 35

CODING FOR 2c-

```
#midrange

c) age_values <- c(13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70)

X<-(min(age_values)+max(age_values))/2

print(X)
```

OUTPUT-

41.5

CODING FOR 2d-

```
d) #quartile

age_values <- c(13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70)

quantile(age_values)
```

output: 0% 25% 50% 75% 100%

13.0 20.5 25.0 35.0 70.0

3.Data Preprocessing :Reduction and Transformation

Use the two methods below to normalize the following group of data: 200, 300, 400, 600, 1000 (a) min-max normalization by setting min = 0 and max = 1 (b) z-score normalization

Coding:

```
#3a

data <- c(200, 300, 400, 600, 1000)

min<-min(data)
```

```
max<-max(data)
for (i in data)
{
  result1=i-min
  result2=max-min
  result3=result1/result2
  print(result3)
}
```

OUTPUT:

```
[1] 0
[1] 0.125
[1] 0.25
[1] 0.5
[1] 1
```

#3b

```
 data <- c(200, 300, 400, 600, 1000)
mean1<-mean(data)
deviation<-sd(data)
for (i in data)
{
  result1=i-mean1
  result2=result1/deviation
  print(result2)
}
```

OUTPUT:

```
[1] -0.9486833
[1] -0.6324555
[1] -0.3162278
[1] 0.3162278
[1] 1.581139
```

4.Data:11,13,13,15,15,16,19,20,20,20,21,21,22,23,24,30,40,45,45,45,71, 72,73,75

a) **Smoothing by bin mean**

b) Smoothing by bin median

c) Smoothing by bin boundaries

CODING-

```
#binning
data <- c(11, 13, 13, 15, 15, 16, 19, 20, 20, 20, 21, 21, 22, 23, 24, 30, 40, 45, 45, 45, 71, 72, 73, 75)
range=6
bin1=c()
bin2=c()
bin3=c()
bin4=c()
for(i in data[1:range]){
  bin1=append(bin1,i)
}
range1=range+1
range2=range*2
for(j in data[range1:range2])
{
  bin2=append(bin2,j)
}
range3=range2+1
range4=range*3
for(k in data[range3:range4])
{
  bin3=append(bin3,k)
}
range5=range4+1
```

```
range6=range*4
for(l in data[range5:range6]){
  bin4=append(bin4,l)
}
```

#4a

```
mean(bin1)
mean(bin2)
mean(bin3)
mean(bin4)
```

#4b

```
median(bin1)
median(bin2)
median(bin3)
median(bin4)
```

OUTPUT:

#4a

```
> mean(bin1)
[1] 13.83333
> mean(bin2)
[1] 20.16667
> mean(bin3)
[1] 30.66667
> mean(bin4)
[1] 63.5
>
```

#4b

```
> median(bin1)
[1] 14
> median(bin2)
[1] 20
> median(bin3)
```

[1] 27

> median(bin4)

[1] 71.5

5) 5. Suppose that a hospital tested the age and body fat data for 18 randomly selected adults with the following results:

age	23	23	27	27	39	41	47	49	50
%fat	9.5	26.5	7.8	17.8	31.4	25.9	27.4	27.2	31.2
age	52	54	54	56	57	58	58	60	61
%fat	34.6	42.5	28.8	33.4	30.2	34.1	32.9	41.2	35.7

CODING-

age <- c(23,23,27,27,39,41,47,49,50,52,54,54,56,57,58,58,60,61)

body_fat_percent <-
c(9.5,26.5,7.8,17.8,31.4,25.9,27.4,27.2,31.2,34.6,42.5,28.8,33.4,30.2,34.1,32.9,41.2,35.7)

#5.a

mean(age)

mean(body_fat_percent)

median(age)

median(body_fat_percent)

sd(age)

sd(body_fat_percent)

#5.b

#create dataframe

df<-data.frame(age,body_fat_percent)

#box plot

boxplot(df)

#scatter plot

```
plot(df)
#qq plot
qqnorm(age)
qqline(age)
qqnorm(body_fat_percent)
qqline(body_fat_percent)
```

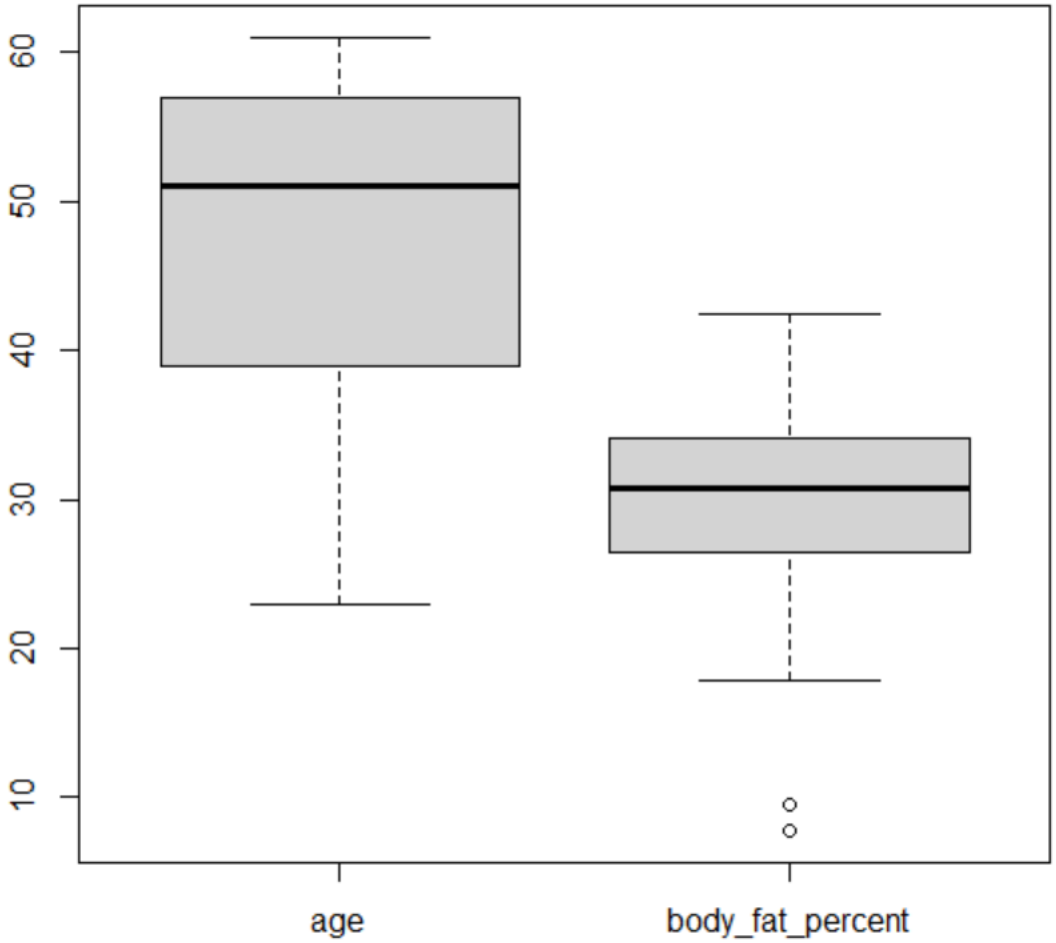
OUTPUT-

#5a

```
> mean(age)
 [1] 46.44444
> mean(body_fat_percent)
 [1] 28.78333
 > median(age)
[1] 51
 > median(body_fat_percent)
 [1] 30.7
> sd(age)
 [1] 13.21862
> sd(body_fat_percent)
 [1] 9.254395
```

#5.b

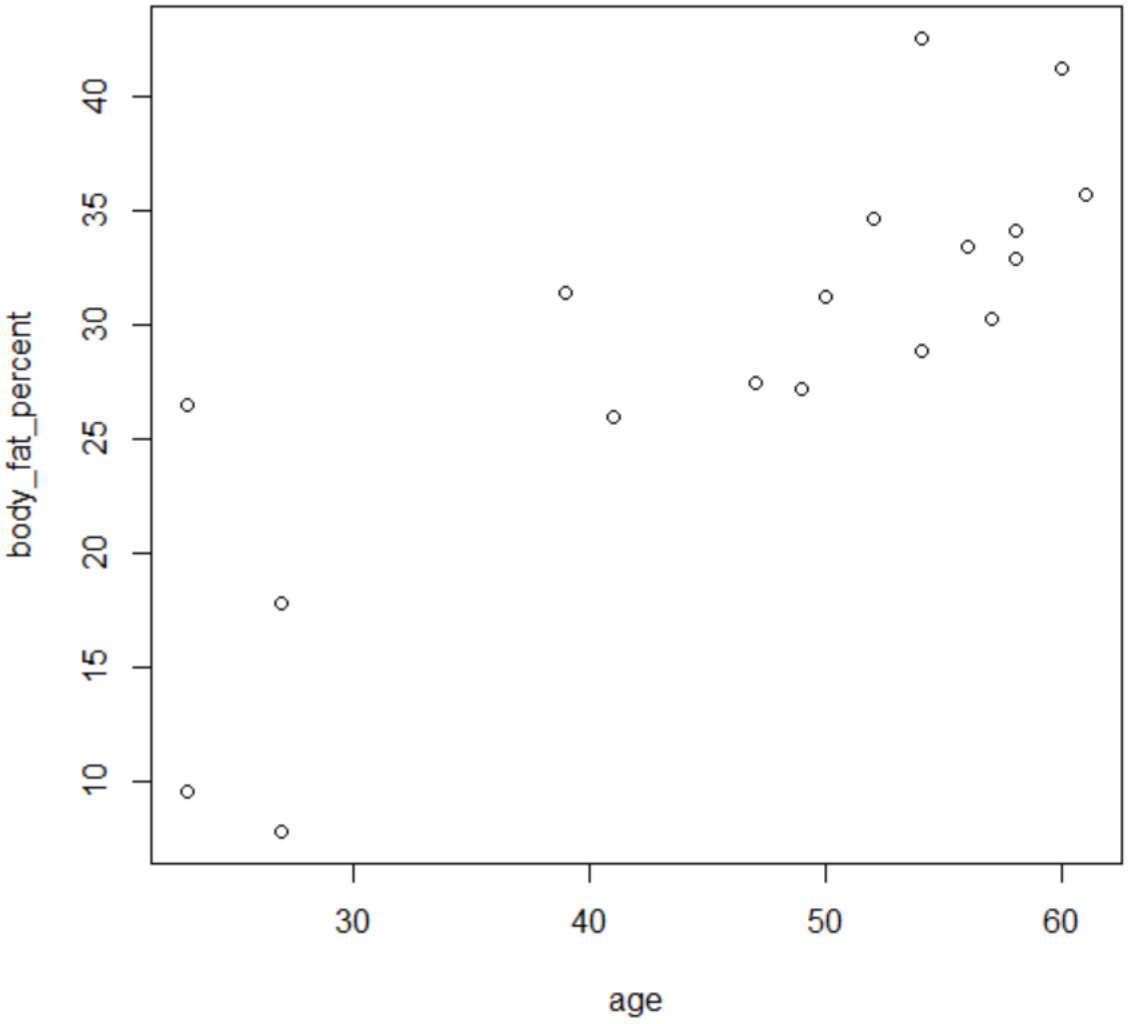
BOXPLOT-



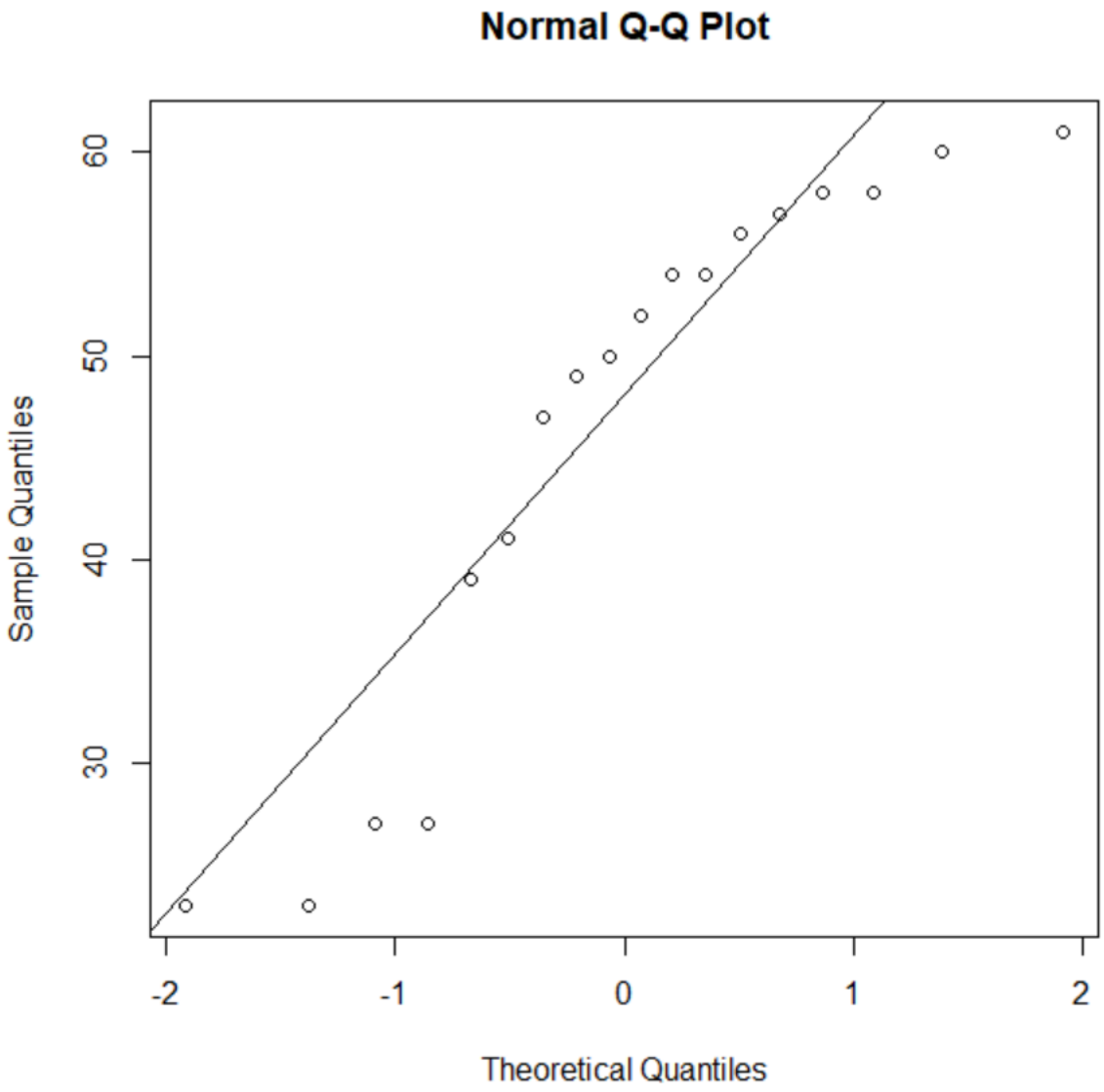
SCATTER PLOT-

#5c

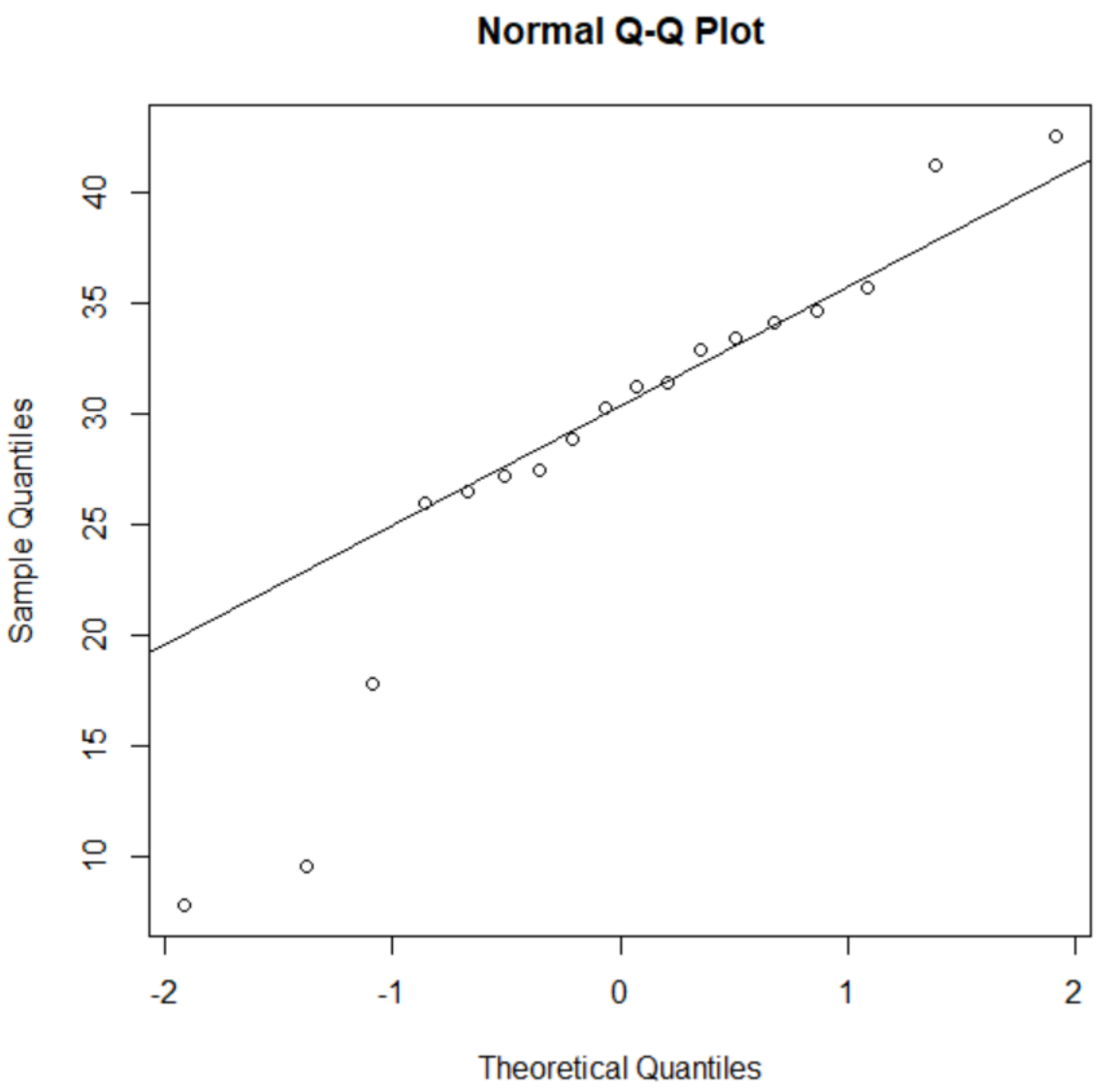
QQ



QQ PLOT FOR AGE-



QQPLOT FOR BODY FAT PERCENT-



6.Suppose that a hospital tested the age and body fat data for 18 randomly selected adults with the following results:

(i) Use min-max normalization to transform the value 35 for age onto the range [0.0, 1.0].
(ii) Use z-score normalization to transform the value 35 for age, where the standard deviation of age is 12.94 years.
(iii) Use normalization by decimal scaling to transform the value 35 for age. Perform the above functions using R – tool

CODING-

```
age <- c(23,23,27,27,39,41,47,49,50,52,54,54,56,57,58,58,60,61)

new_age<-c()

for(i in age){
```

```
  if(i<=35){
    new_age=append(new_age,i)
  }
}
print(new_age)
```

#6a

```
#min max normalization
min<-min(new_age)
max<-max(new_age)
for (i in new_age)
{
  result1=i-min
  result2=max-min
  result3=result1/result2
  print(result3)
}
```

#6b

```
#z score normalization
mean1<-mean(new_age)
for (i in new_age)
{
  result1=i-mean1
  result2=result1/12.94
  print(result2)
}
```

#6c

```
#decimal scaling
n=200
j=nchar(y)
scaling=n/10^j
print(scaling)
```

OUTPUT-

6.a MIN MAX NORMALIZATION

[1] 0

[1] 0

[1] 1

[1] 1

6.b Z SCORE NORMALIZATION

[1] -0.8660254

[1] -0.8660254

[1] 0.8660254

[1] 0.8660254

6.c DECIMAL SCALING

[1] 0.2

7.The following values are the number of pencils available in the different boxes. Create a vector and find out the mean, median and mode values of set of pencils in the given data.

Box1	Box2	Box3	Box4	Box5	Box6	Box7	Box8	Box9	Box 10
9	25	23	12	11	6	7	8	9	10

CODING-

```
box_no=c("box1","box2","box3","box4","box5","box6","box7","box8","box9","box10")
pencil=c(9,25,23,12,11,6,7,8,9,10)
df<-data.frame(box_no,pencil)
#dataframe
print(df)
#mean
mean(pencil)
```

```
#median
median(pencil)
#mode
mode=names(which.max(table(pencil)))
print(mode)
```

OUTPUT-

```
> data.frame(box_NO,pencil)
   box_NO pencil
1    box1      9
2    box2     25
3    box3     23
4    box4     12
5    box5     11
6    box6      6
7    box7      7
8    box8      8
9    box9      9
10  box10     10
> mean(pencil)
[1] 12
> median(pencil)
[1] 9.5
> print(mode)
[1] "9"
```

8. the following table would be plotted as (x,y) points, with the first column being the x values as number of mobile phones sold and the second column being the y values as money. To use the scatter plot for how many mobile phones sold.

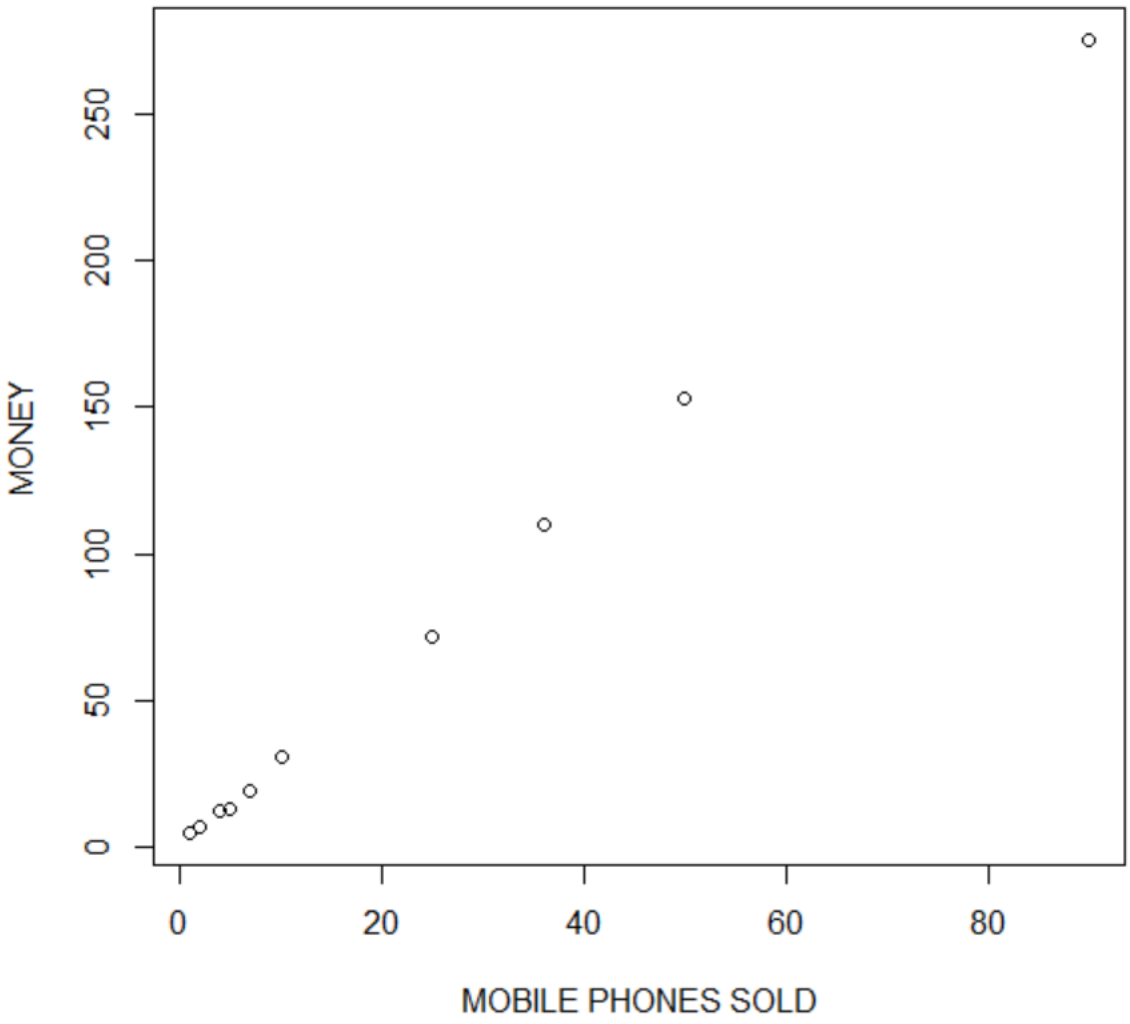
x :4 1 5 7 10 2 50 25 90 36

y :12 5 13 19 31 7 153 72 275 110

CODING-

```
x<-c(4, 1, 5, 7, 10, 2, 50, 25, 90, 36)

y<-c(12,5, 13, 19, 31, 7, 153, 72, 275, 110)

plot(x,y,xlab='MOBILE PHONES SOLD',ylab='MONEY')
```

OUTPUT-



9. Implement of the R script using marks scored by a student in his model exam has been sorted as follows: 55, 60, 71, 63, 55, 65, 50, 55,58,59,61,63,65,67,71,72,75. Partition them into three bins by each of the following methods. Plot the data points using histogram.

(a) equal-frequency (equi-depth) partitioning (b) equal-width partitioning

CODING-

```
marks<-c(55, 60, 71, 63, 55, 65, 50, 55,58,59,61,63,65,67,71,72,75)

binning1=c()

binning2=c()

binning3=c()

class=6

#binning partition

for(a in marks[1:class]){

  binning1=append(binning1,a)

}

range1=range+1

range2=range*2

for(b in marks[range1:range2])

{

  binning2=append(binning2,b)

}

range3=range2+1

range4=range*3

for(c in marks[range3:range4])

{
```

```
  binning3=append(binning3,c)
}
print(binning1)
print(binning2)
print(binning3)
#histogram
hist(binning1)
hist(binning2)
hist(binning3)
#9a
#equal-frequency
freq=length(marks)/range
print(freq)
#9b
#equal-width
min<-min(marks)
max<-max(marks)
result<-max-min
width<-result/range
cat("width is",width)
bin1=width+min
print(bin1)
bin2=2*width+min
print(bin2)
```

bin3=3*width+min

print(bin3)

OUTPUT-

> print(binning1)

[1] 55 60 71 63 55 65

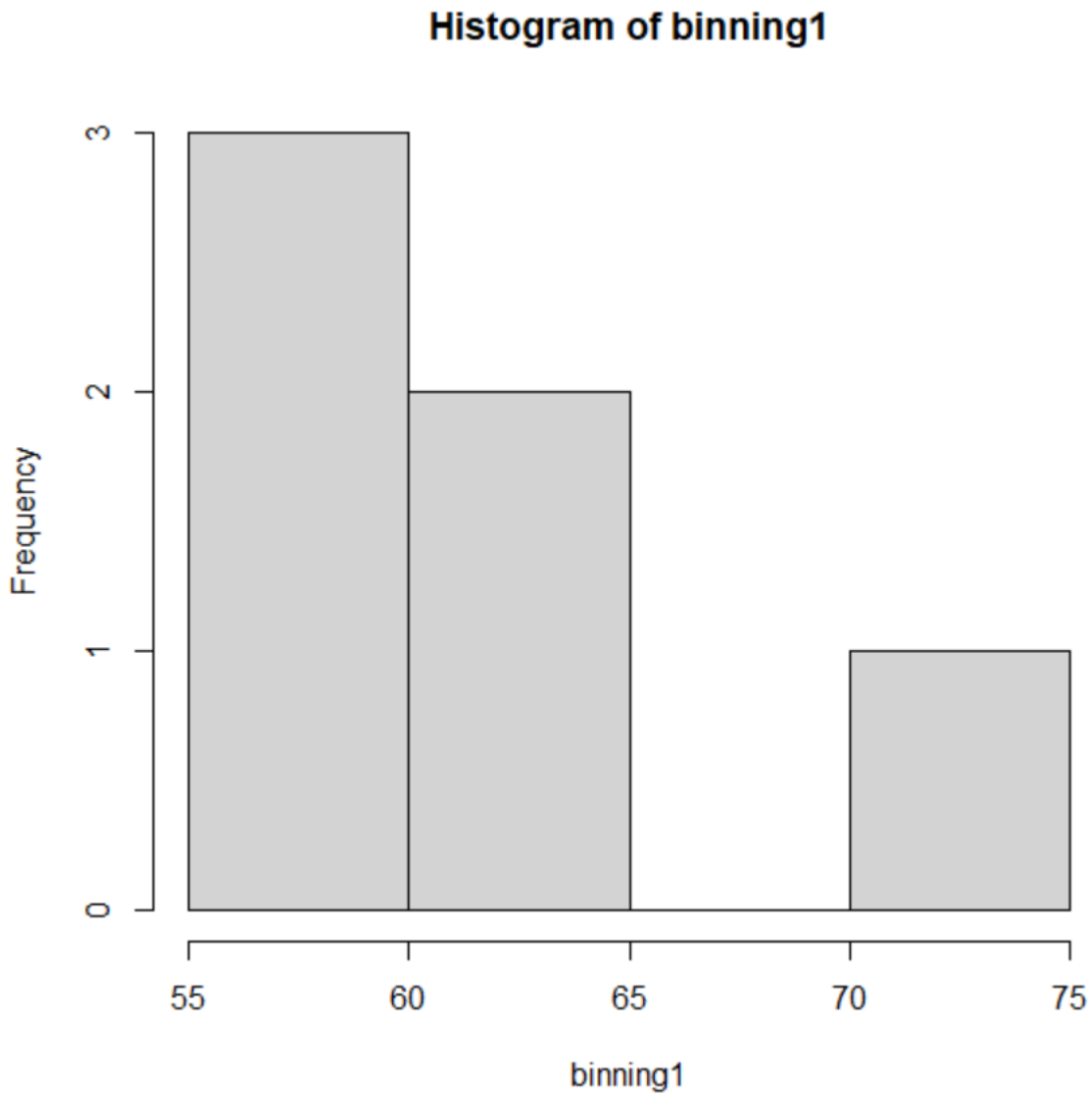
> print(binning2)

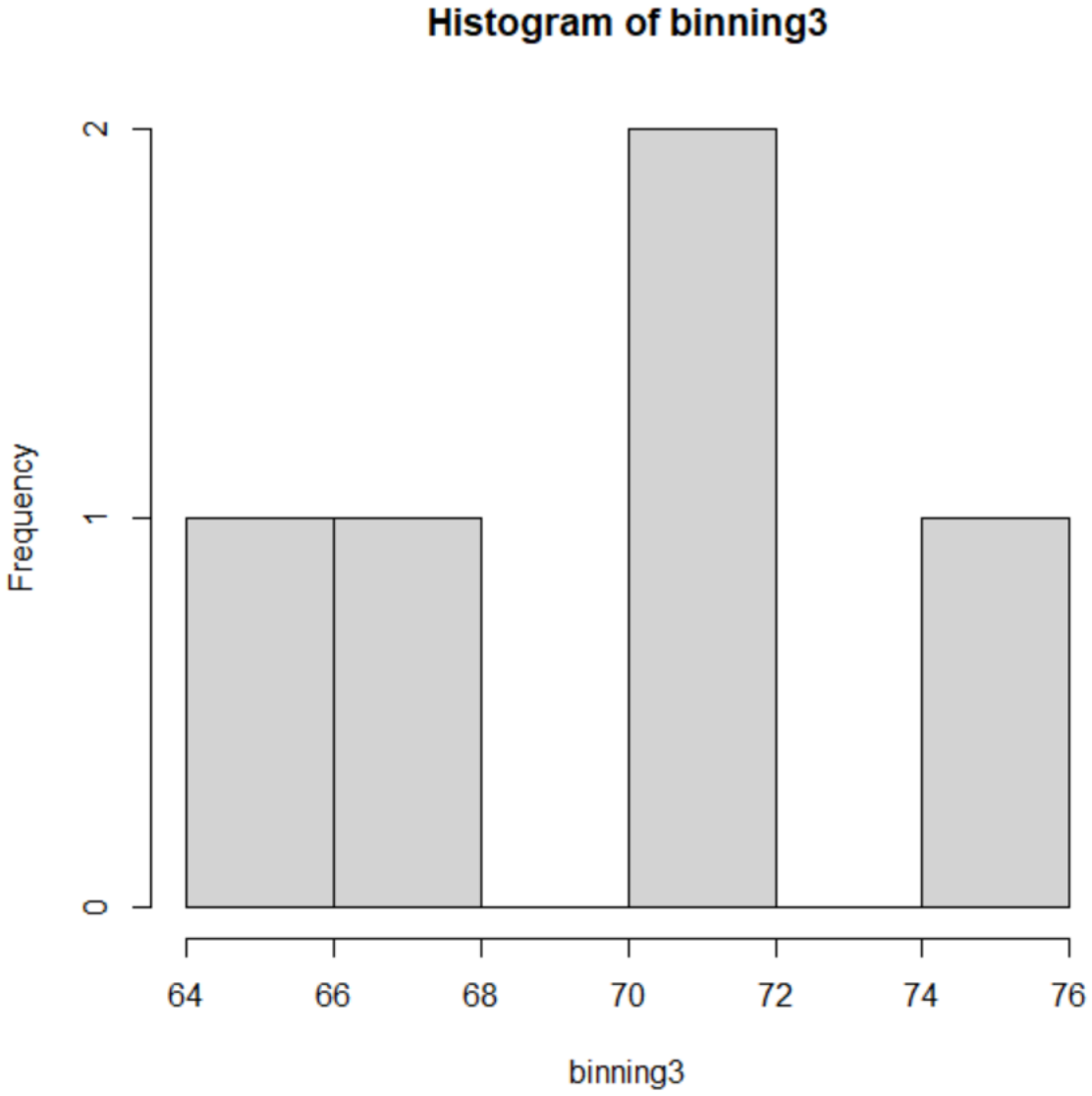
[1] 50 55 58 59 61 63

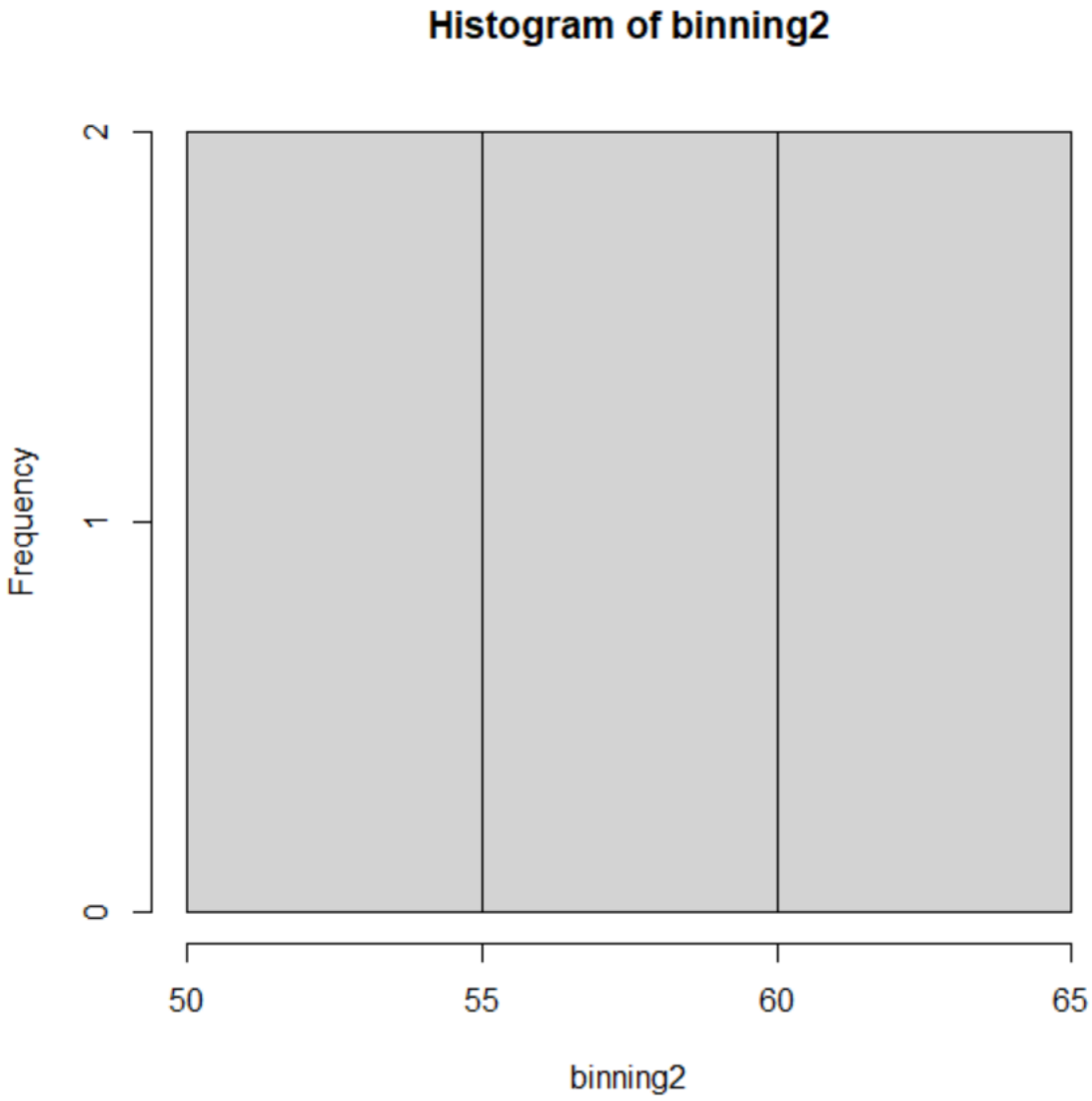
> print(binning3)

[1] 65 67 71 72 75 NA

HISTOGRAM-


Histogram of binning1
Frequency
0
1
2
3
55
60
65
70
75
binning1


Histogram of binning3
Frequency
0
1
2
64
66
68
70
72
74
76
binning3



#9a

#equal frequency

> print(freq)

[1] 2.833333

#9b

#equal width

width is 4.166667> bin1=width+min

> print(bin1)

[1] 54.16667

```
> bin2=2*width+min

> print(bin2)

[1] 58.33333

> bin3=3*width+min

> print(bin3)

[1] 62.5
```

10. Suppose that the speed car is mentioned in different driving style.

Regular 78.3 81.8 82 74.2 83.4 84.5 82.9 77.5 80.9 70.6 Speed

Calculate the Inter quantile and standard deviation of the given data.

CODING-

```
speed<-c(78.3 ,81.8 ,82 ,74.2 ,83.4 ,84.5 ,82.9 ,77.5 ,80.9 ,70.6 )

#interquartile

IQR(speed)

#standard deviation

sd(speed)
```

OUTPUT-

```
> IQR(speed)

[1] 4.975

> sd(speed)

[1] 4.445835
```

11.Suppose that the data for analysis includes the attribute age. The age values for the data tuples are (in increasing order) 13, 15, 16, 16, 19, 20, 20, 21, 22, 22, 25, 25, 25, 25, 30, 33, 33, 35, 35, 35, 35, 36, 40, 45, 46, 52, 70.

Can you find (roughly) the first quartile (Q1) and the third quartile (Q3) of the data?

CODING-x

OUTPUT-

> quantile(marks)

 0% 25% 50% 75% 100%

13.0 20.5 25.0 35.0 70.0

12.Covariance and correlation
Children of three ages are asked to indicate their preference for three photographs of adults. Do the data suggest that there is a significant relationship between age and photograph preference? What is wrong with this study?

	Photograph:		
Age of child	A	B	C
5-6 years:	18	22	20
7-8 years:	2	28	40
9-10 years:	20	10	40

(i)Use cov() to calculate the sample covariance between B and C.
(ii)Use another call to cov() to calculate the sample covariance matrix for the preferences.
(iii)Use cor() to calculate the sample correlation between B and C.
(iv)Use another call to cor() to calculate the sample correlation matrix for the preferences.

CODE:
(i)b<-c(22, 28, 10)
c<-c(20, 40, 40)
cov(b,c)

(ii)a<-c(18, 2, 20)
b<-c(22, 28, 10)
c<-c(20, 40, 40)
pre<-cbind(a,b,c)

cov(pre)

(iii).b<-c(22, 28, 10)
c<-c(20, 40, 40)
cor(b,c)

(iv)a<-c(18, 2, 20)
b<-c(22, 28, 10)
c<-c(20, 40, 40)
pre<-cbind(a,b,c)
cor(pre)

OUTPUT:

```
> b<-c(22, 28, 10)
> c<-c(20, 40, 40)
> cov(b,c)
[1] -20
> a<-c(18, 2, 20)
> b<-c(22, 28, 10)
> c<-c(20, 40, 40)
> pre<-cbind(a,b,c)
> cov(pre)
          a   b         c
a  97.33333 -74 -46.66667
b -74.00000  84 -20.00000
c -46.66667 -20 133.33333
> b<-c(22, 28, 10)
> c<-c(20, 40, 40)
> cor(b,c)
[1] -0.1889822
> a<-c(18, 2, 20)
> b<-c(22, 28, 10)
> c<-c(20, 40, 40)
> pre<-cbind(a,b,c)
> cor(pre)
           a          b          c
a  1.0000000 -0.8183918 -0.4096440
b -0.8183918  1.0000000 -0.1889822
c -0.4096440 -0.1889822  1.0000000
```

13.Imagine that you have selected data from the All Electronics data warehouse for analysis. The data set will be huge! The following data are a list of All Electronics prices for commonly sold items (rounded to the nearest dollar). The numbers have been sorted: 1, 1, 5, 5, 5, 5, 5, 8, 8, 10, 10, 10, 10, 12, 14, 14, 14, 15, 15, 15, 15, 15, 15, 18, 18, 18, 18, 18,

18, 18, 18, 20, 20, 20, 20, 20, 20, 20, 21, 21, 21, 21, 25, 25, 25, 25, 25, 28, 28, 30,
30, 30.

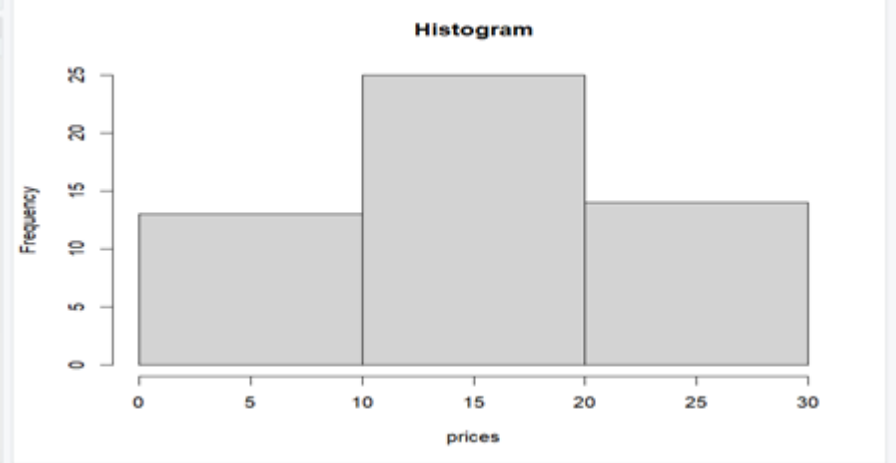
(i) Partition the dataset using an equal-frequency partitioning method with bin equal to 3 (ii) apply data smoothing using bin means and bin boundary.
(iii) Plot Histogram for the above frequency division

CODE:

```
data<-c(1, 1, 5, 5, 5, 5, 5, 8, 8, 10, 10, 10, 10, 12, 14, 14, 14, 15, 15, 15, 15, 15, 15, 18, 18, 18, 18, 18, 18, 18, 18, 20, 20, 20, 20, 20, 20, 20, 21, 21, 21, 21, 25, 25, 25, 25, 25, 28, 28, 30, 30, 30)
bin<-length(data)/3
bins<-cut(data, breaks = c(-Inf, quantile(data, probs = seq(0,1, 1/3)),Inf), include.lowest = TRUE)
tapply(data,bins,mean)
tapply(data, bins,function(x) c(min(x),max(x)))


hist(data,breaks = 3, main = "Histogram", xlab = "prices")
```

OUTPUT:

```
Console   Terminal   Background Jobs
R 4.2.2 · ~/
> data<-c(1, 1, 5, 5, 5, 5, 5, 8, 8, 10, 10, 10, 10, 12, 14, 14, 14, 15, 15, 15, 15, 15, 15, 18, 1
8, 18, 18, 18, 18, 18, 20, 20, 20, 20, 20, 20, 20, 21, 21, 21, 21, 25, 25, 25, 25, 25, 28, 28,
30, 30, 30)
> bin<-length(data)/3
> bins<-cut(data, breaks = c(-Inf, quantile(data, probs = seq(0,1, 1/3)),Inf), include.lowest = TRU
E)
> tapply(data,bins,mean)
 [-Inf,1]    (1,15]   (15,20]   (20,30] (30, Inf]
  1.00000  10.71429  18.93333  25.35714        NA
> tapply(data, bins,function(x) c(min(x),max(x)))
$`[-Inf,1]`
[1] 1 1

$`(1,15]`
[1]  5 15

$`(15,20]`
[1] 18 20

$`(20,30]`
[1] 21 30

$`(30, Inf]`
NULL

>
> hist(data,breaks = 3, main = "Histogram", xlab = "prices")
>
```



14.Two Maths teachers are comparing how their Year 9 classes performed in the end of year exams. Their results are as follows:
Class A: 76, 35, 47, 64, 95, 66, 89, 36, 8476,35,47,64,95,66,89,36,84
Class B: 51, 56, 84, 60, 59, 70, 63, 66, 5051,56,84,60,59,70,63,66,50
(i) Find which class had scored higher mean, median and range.
(ii) Plot above in boxplot and give the inferences
Class B: 51, 56, 84, 60, 59, 70, 63, 66, 5051,56,84,60,59,70,63,66,50

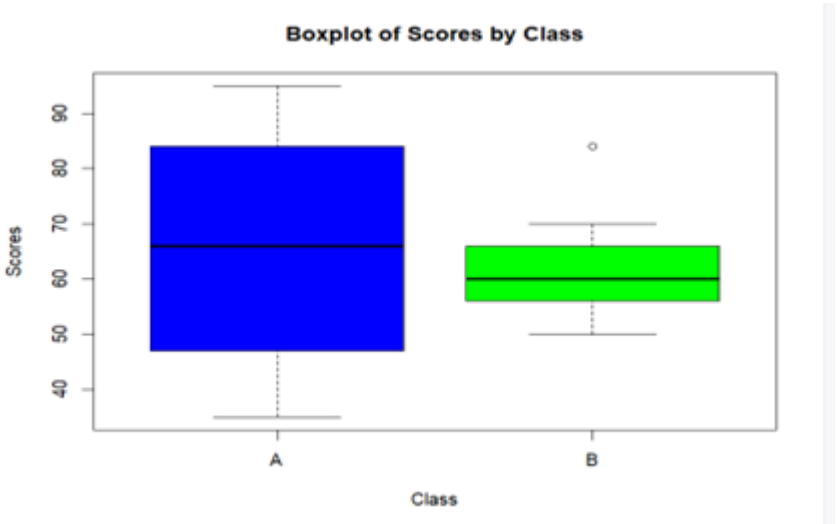
CODE:

```
A <- c(76, 35, 47, 64, 95, 66, 89, 36, 84)
B <- c(51, 56, 84, 60, 59, 70, 63, 66, 50)


mean_A <- mean(A)
median_A <- median(A)
range_A <- max(A) - min(A)
mean_B <- mean(B)
median_B <- median(B)
```

```
range_B <- max(B) - min(B)


combined_data <- data.frame(Class = c(rep("A", length(A)), rep("B", length(B))), Score = c(A, B))
boxplot(Score ~ Class, data = combined_data, col = c("blue", "green"), xlab = "Class", ylab = "Scores",
main = "Boxplot of Scores by Class")
```
(II)

```
combined_data <- data.frame(Class = c(rep("A", length(A)), rep("B", length(B))), Score = c(A, B))


boxplot(Score ~ Class, data = combined_data, col = c("blue", "green"), xlab = "Class", ylab = "Scores",
main = "Boxplot of Scores by Class")
```

OUTPUT:



15.Let us consider one example to make the calculation method clear. Assume that the minimum and maximum values for the feature F are $50,000 and $100,000 correspondingly. It needs to range *F* from 0 to 1. In accordance with min-max normalization, *v* = $80,
b) Use the two methods below to normalize the following group of data: 200, 300, 400, 600, 1000
(a) min-max normalization by setting min = 0 and max = 1
(b) z-score normalization

CODE:

```
data <- c(200, 300, 400, 600, 1000)


min_value <- 50000
max_value <- 100000
v <- 80
min_max_normalized <- (v - min_value) / (max_value - min_value)
min_max_normalized
mean_value <- mean(data)
standard_deviation <- sd(data)
```

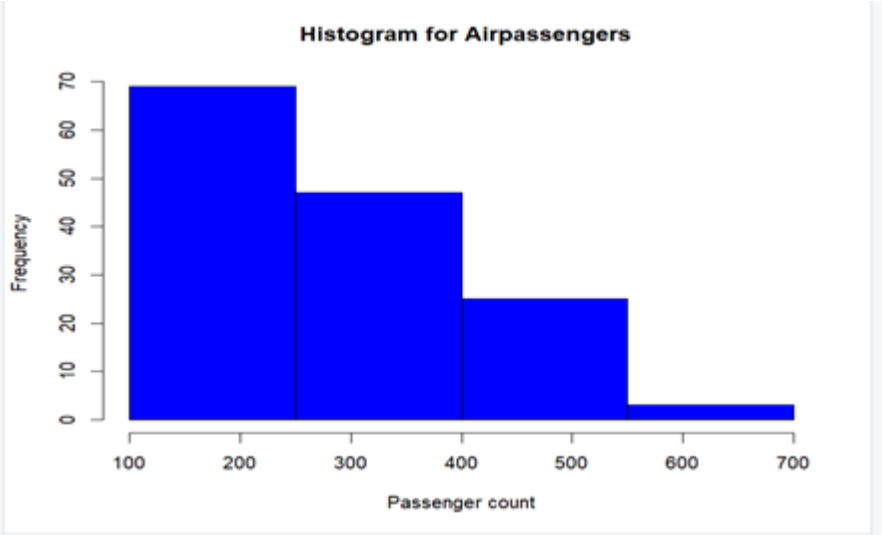
z_score_normalized <- (v - mean_value) / standard_deviation
z_score_normalized
OUTPUT:

```
> data <- c(200, 300, 400, 600, 1000)
>
> min_value <- 50000
> max_value <- 100000
> v <- 80
> min_max_normalized <- (v - min_value) / (max_value - min_value)
> min_max_normalized
[1] -0.9984
> mean_value <- mean(data)
> standard_deviation <- sd(data)
> z_score_normalized <- (v - mean_value) / standard_deviation
> z_score_normalized
[1] -1.328157
```

16.Make a histogram for the “AirPassengers “dataset, start at 100 on the x-axis, and from values 200 to 700, make the bins 150 wide

CODE:
data("AirPassengers")
hist(AirPassengers, breaks = seq(100, 700, by = 150), col = "blue", main=" Histogram for Airpassengers", xlab = "Passenger count", ylab = "Frequency")

OUTPUT:



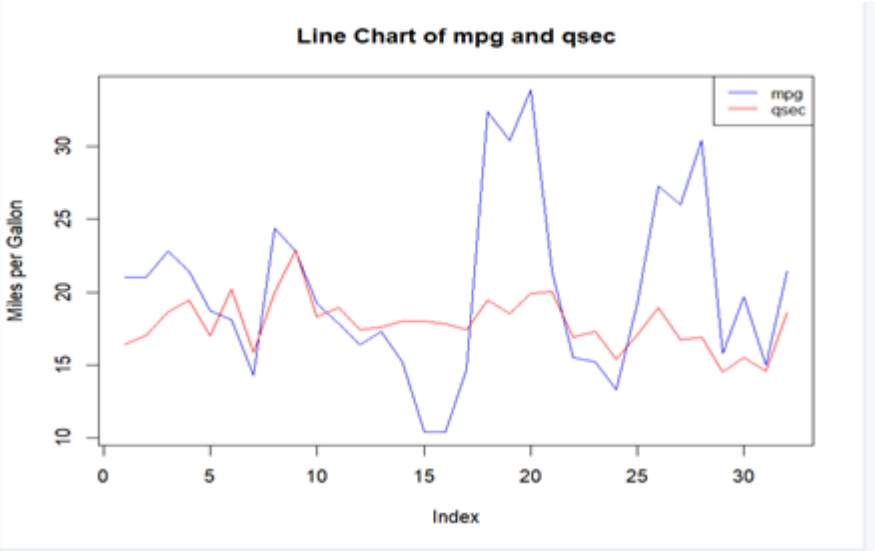
17.Obtain Multiple Lines in Line Chart using a single Plot Function in R.Use attributes“mpg”and“qsec”of the dataset “mtcars”

CODE:
data("mtcars")

plot(mtcars$mpg, type = "l", col = "blue", xlab = "Index", ylab = "Miles per Gallon", main = "Line Chart of mpg and qsec")

```
lines(mtcars$qsec, col = "red")
legend("topright", legend = c("mpg", "qsec"), col = c("blue", "red"), lty = 1, cex = 0.8)
```

OUTPUT:



18.Download the Dataset "water" From R dataset Link.Find out whether there is a linear relation between attributes"mortality" and"hardness" by plot function.Fit the Data into the Linear Regression model.Predict the mortality for the hardness=88.

CODE:

```
data("iris")
str(iris)
plot(iris$Sepal.Length, iris$Petal.Length, main = "Scatter plot of Sepal.Length vs. Petal.Length",xlab =
"Sepal.Length", ylab = "Petal.Length", col = "blue", pch = 16)
model <- lm(Petal.Length ~ Sepal.Length, data = iris)
abline(model, col = "red")
new_data <- data.frame(Sepal.Length = 5.5)
predicted_Petal_Length <- predict(model, newdata = new_data)
predicted_Petal_Length
```

OUTPUT:

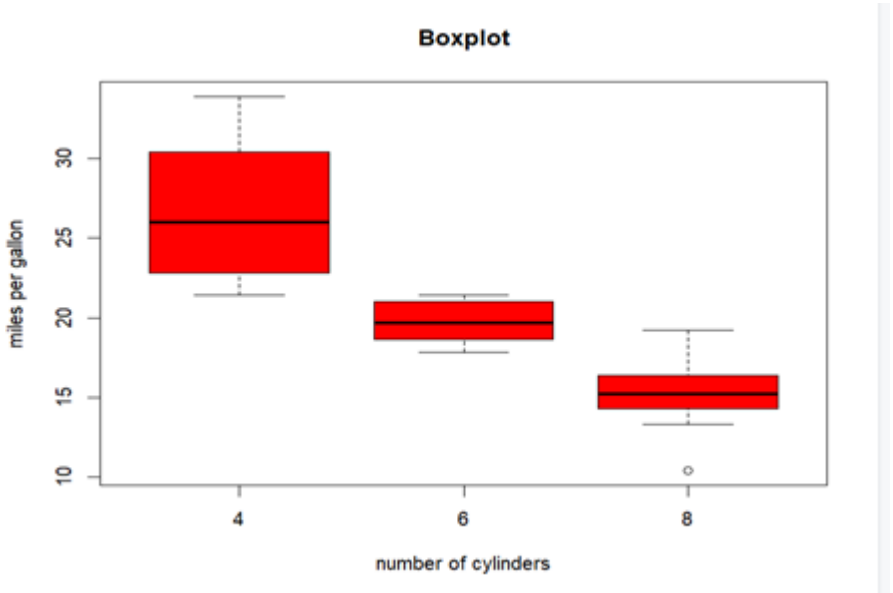
```
> str(iris)
'data.frame':   150 obs. of  5 variables:
 $ Sepal.Length: num  5.1 4.9 4.7 4.6 5 5.4 4.6 5 4.4 4.9 ...
 $ Sepal.Width : num  3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 ...
 $ Petal.Length: num  1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 ...
 $ Petal.Width : num  0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 ...
 $ Species     : Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1 1 1 1 1 1 1 ...
> plot(iris$Sepal.Length, iris$Petal.Length, main = "Scatter plot of Sepal.Length vs. Petal.Lengt
h",xlab = "Sepal.Length", ylab = "Petal.Length", col = "blue", pch = 16)
> model <- lm(Petal.Length ~ Sepal.Length, data = iris)
> abline(model, col = "red")
> new_data <- data.frame(Sepal.Length = 5.5)
> predicted_Petal_Length <- predict(model, newdata = new_data)
> predicted_Petal_Length
       1
3.119938
>
```

19.Create a Boxplot graph for the relation between "mpg"(miles per galloon) and "cyl"(number of Cylinders) for the dataset "mtcars" available in R Environment.

CODE:

```
data("mtcars")
boxplot(mpg ~ cyl, data = mtcars, main = "Boxplot", xlab = "number of cylinders", ylab = "miles per gallon", col= "red")
```

OUTPUT:



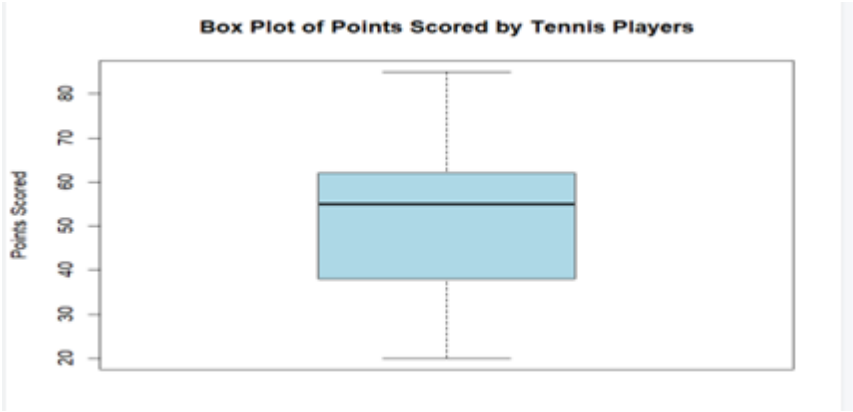
20. Assume the Tennis coach wants to determine if any of his team players are scoring outliers. To visualize the distribution of points scored by his players, then how can he decide to develop the box plot? Give suitable example using Boxplot visualization

technique.

CODE:

```
score <- c(20, 25, 30, 32, 35, 38, 40, 45, 50, 52, 55, 56, 58, 59, 60, 62, 65, 70, 75, 80, 85)

boxplot(score, col = "lightblue", main = "Box Plot of Points Scored by Tennis Players", ylab = "Points Scored")
```

OUTPUT:

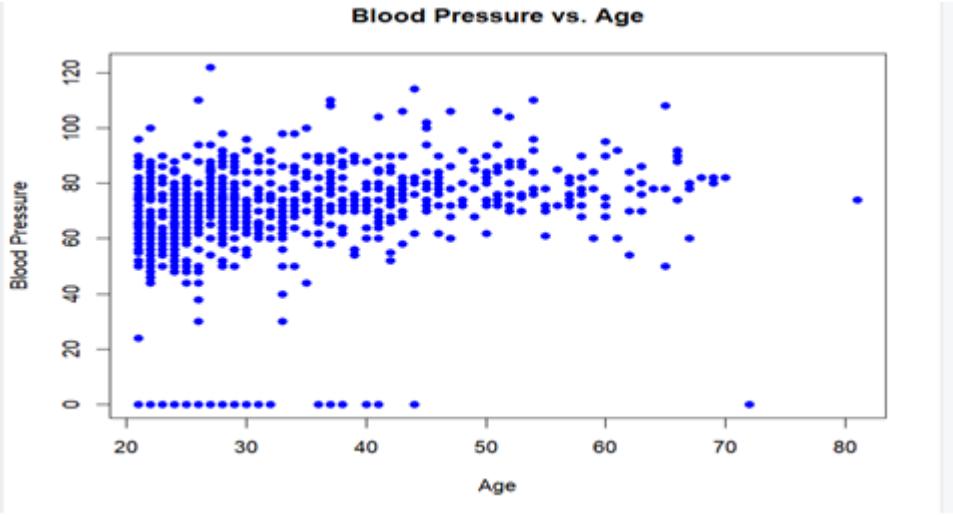


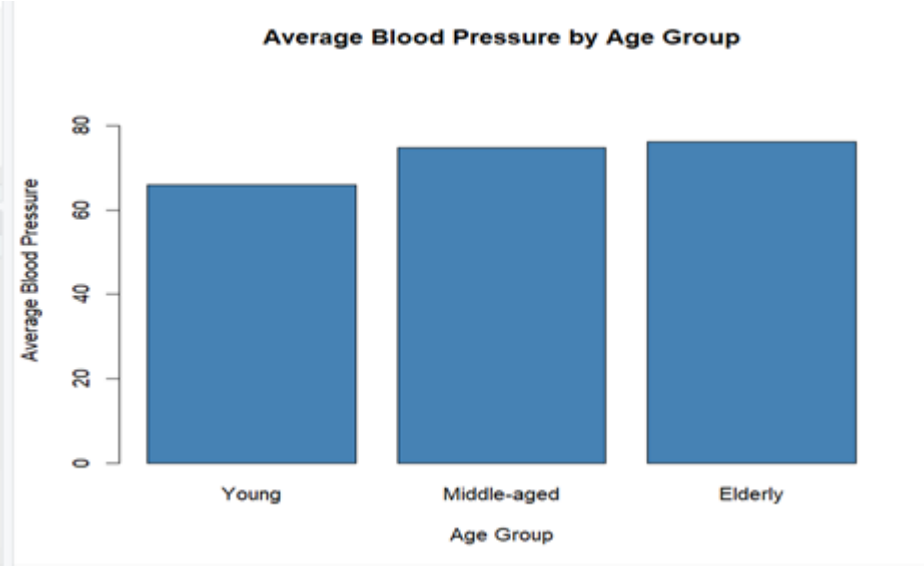
21. Implement using R language in which age group of people are affected by blood pressure based on the diabetes dataset show it using scatterplot and bar chart (that is Blood Pressure vs Age using dataset “diabetes.csv”)

CODE: w

```
dia<-read.csv("C:/Users/haris/Downloads/diabetes.csv")
View(dia)
plot(dia$Age, dia$BloodPressure, xlab = "Age", ylab = "Blood Pressure", main = "Blood Pressure vs. Age", col = "blue",pch = 16)
barplot(dia$Age,dia$Blood_Pressure)
```

OUTPUT:





22.Consider the data set and perform the Apriori Algorithm and FP algorithm support:3 and confidence=50%

Customer ID	Transaction ID	Items Bought
1	0001	$\{a, d, e\}$
1	0024	$\{a, b, c, e\}$
2	0012	$\{a, b, d, e\}$
2	0031	$\{a, c, d, e\}$
3	0015	$\{b, c, e\}$
3	0022	$\{b, d, e\}$
4	0029	$\{c, d\}$
4	0040	$\{a, b, c\}$
5	0033	$\{a, d, e\}$
5	0038	$\{a, b, e\}$

Input:

@relation dataset

@attribute a{true,false}

@attribute b{true,false}

@attribute c{true,false}

@attribute d{true,false}

@attribute e{true,false}

@data

true false false true true

true true true false true

true true false true true

true false true true true

false true true false true

false true false true true

false false true true false

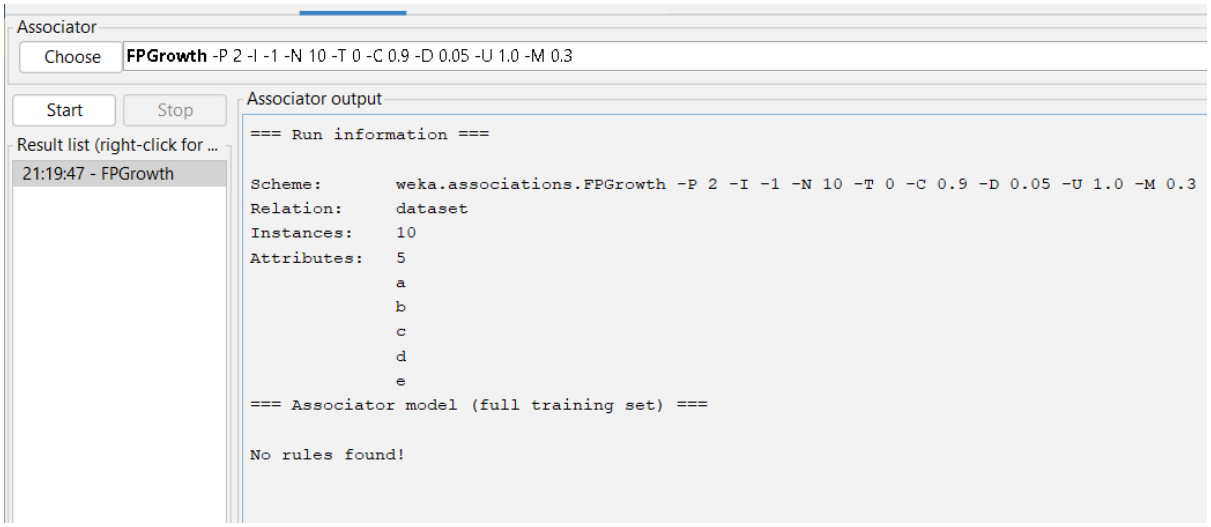
true true true false false

true false false true true

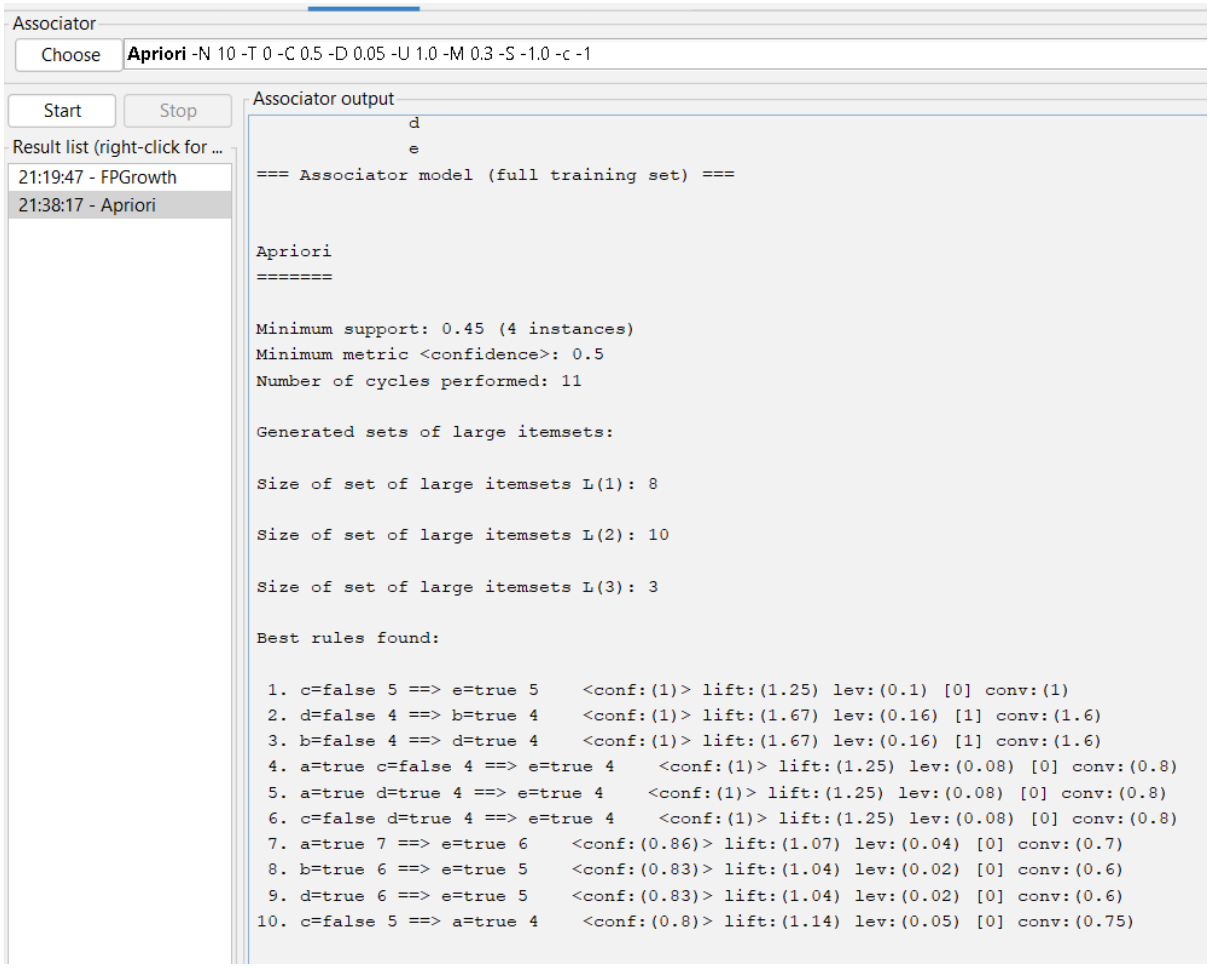
true true false false true

output:

FPGROWTH:



APRIORI ALGORITHM:



23.Consider the data set and perform the Apriori Algorithm and FP algorithm support:3 and confidence=50%

Consider the market basket transactions shown in the above table.

(a) What is the maximum number of association rules that can be extracted

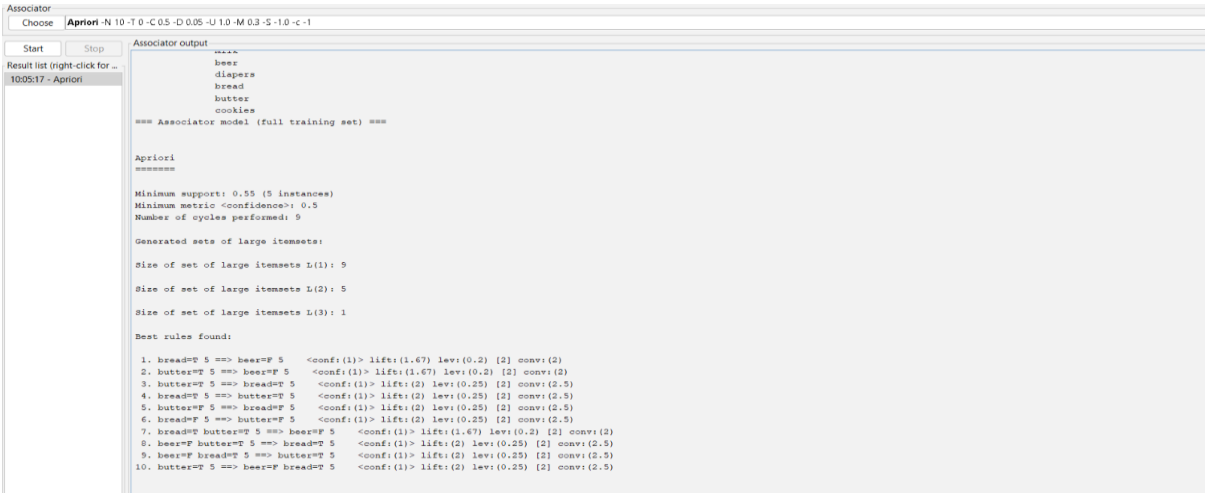
from this data (including rules that have zero support)?

(b) What is the maximum size of frequent itemsets that can be extracted

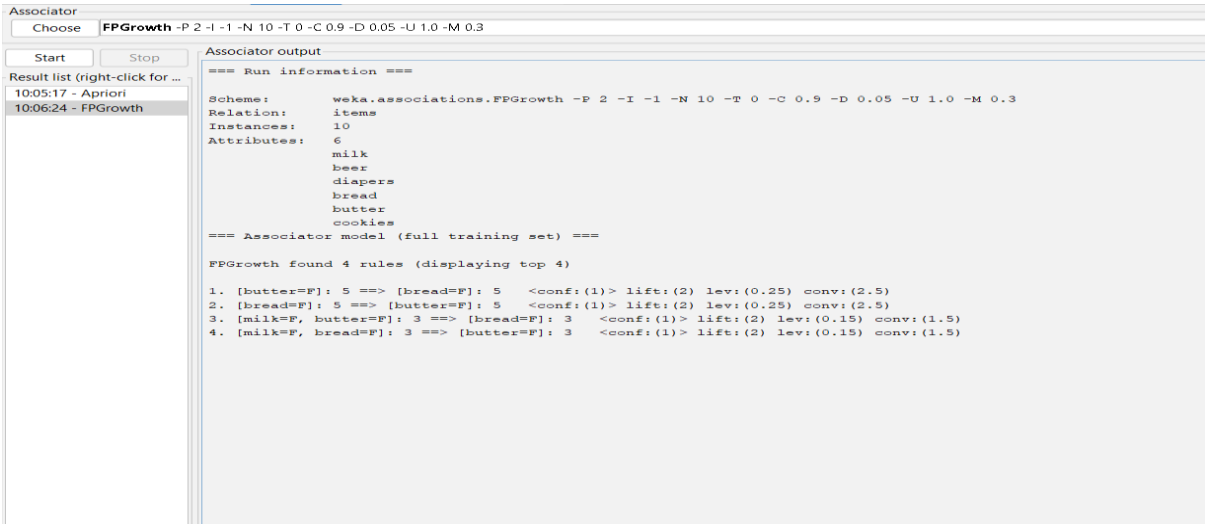
(assuming minsup > 0)?

Transaction ID	Items Bought
1	{Milk, Beer, Diapers}
2	{Bread, Butter, Milk}
3	{Milk, Diapers, Cookies}
4	{Bread, Butter, Cookies}
5	{Beer, Cookies, Diapers}
6	{Milk, Diapers, Bread, Butter}
7	{Bread, Butter, Diapers}
8	{Beer, Diapers}
9	{Milk, Diapers, Bread, Butter}
10	{Beer, Cookies}

Apriori algorithm:



Fp growth algorithm:



24.Bayes classification and descion tree (using training and test data)

RID	age	income	student	credit_rating	Class: buys_computer
1	<=30	high	no	fair	no
2	<=30	high	no	excellent	no
3	31 . . . 40	high	no	fair	yes
4	>40	medium	no	fair	yes
5	>40	low	yes	fair	yes
6	>40	low	yes	excellent	no
7	31 . . . 40	low	yes	excellent	yes
8	<=30	medium	no	fair	no
9	<=30	low	yes	fair	yes
10	>40	medium	yes	fair	yes
11	<=30	medium	yes	excellent	yes
12	31 . . . 40	medium	no	excellent	yes
13	31 . . . 40	high	yes	fair	yes
14	>40	medium	no	excellent	no

Input:

@relation decision_tree

@attribute age{young,middle,old}

@attribute income{low,medium,high}

@attribute student{yes,no}

@attribute Creit_rating{fair,excellent}

@attribute class{yes,no}

@data

young high no fair no

young high no excellent no

middle high no fair yes

old medium no fair yes

old low yes fair yes

old low yes excellent no

middle low yes excellent yes

young medium no fair no

young low yes fair yes

old medium yes fair yes

young medium yes excellent yes

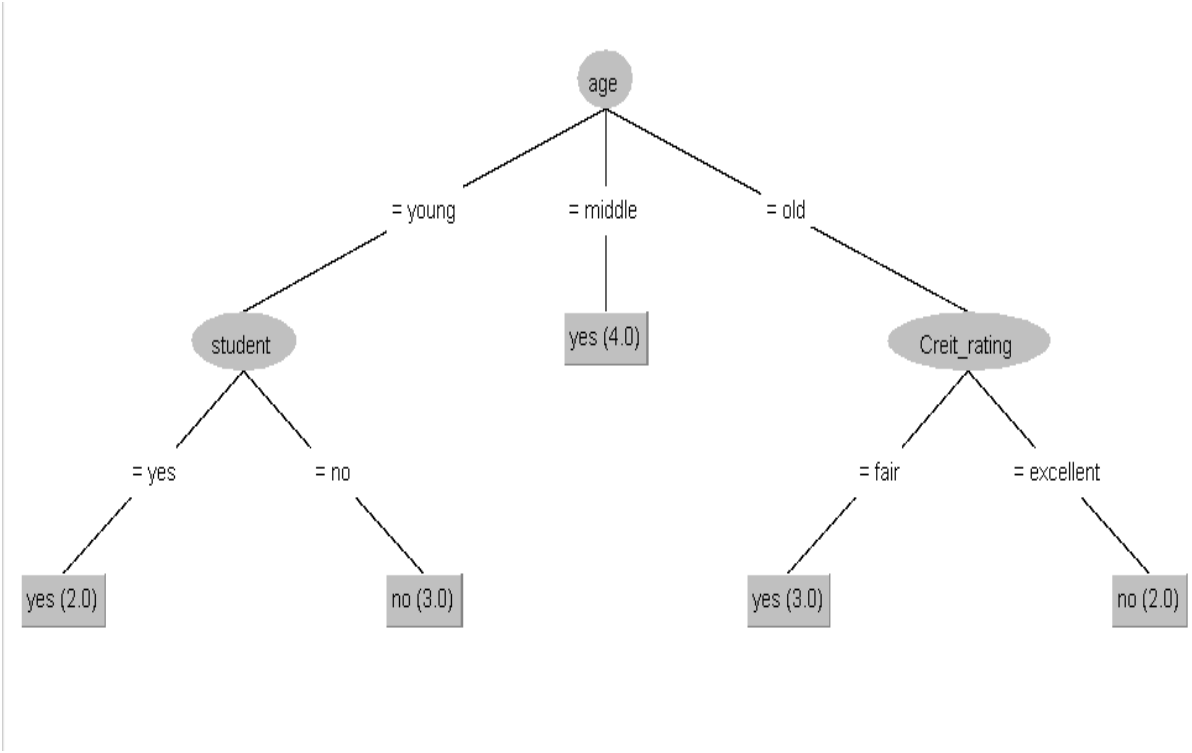
middle medium no excellent yes

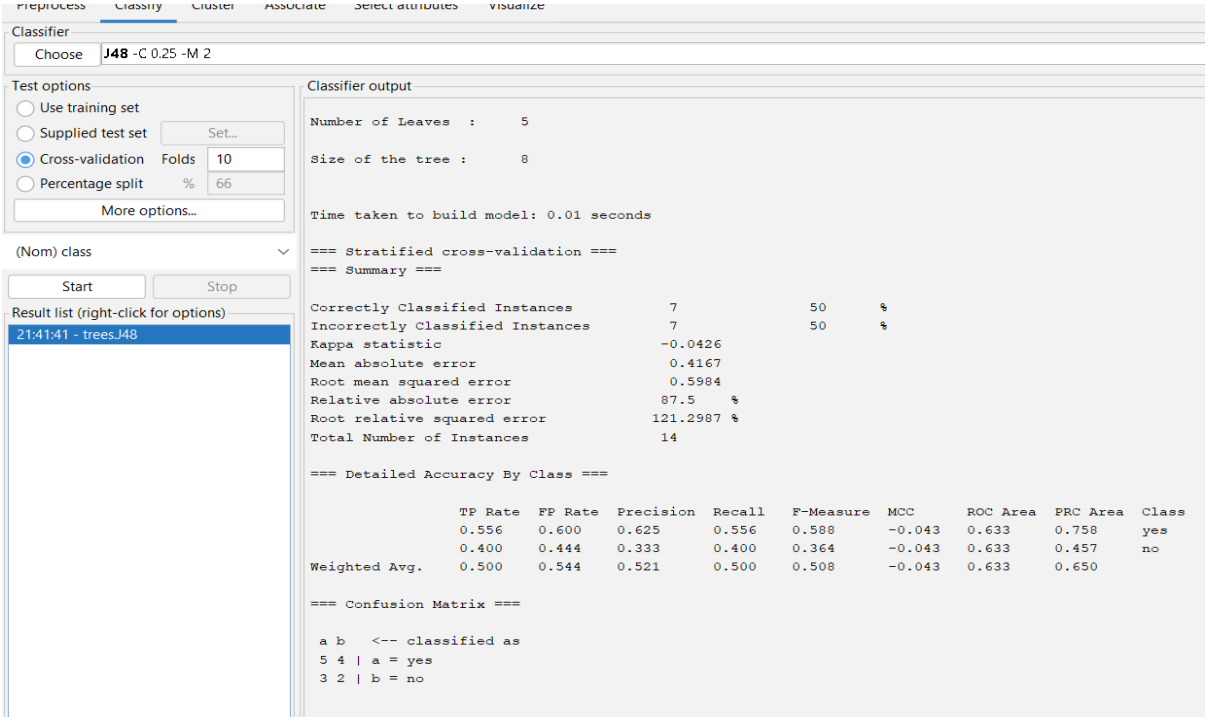
middle high yes fair yes

old medium no excellent no

output:

tree:





25.Analysis the dataset “diabetes. csv” how the diabetes trend is for different age people, using linear regression and multiple regression.

Input:

```
data<-read.csv("C:/Users/Hari Naidu/Desktop/POM/download papers/diabetes.csv")
data
relation<-lm(data$Age~data$Outcome)
relation
relation<-lm(data$Age~data$Outcome+data$BMI)
relation
```

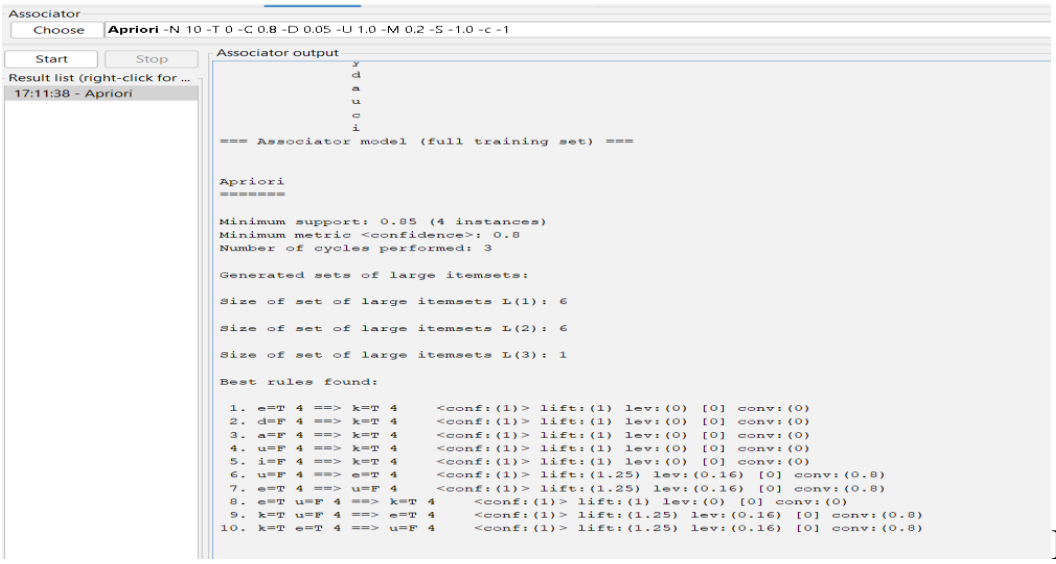
output:

```
 [ reached 'max' / getOption("max.print") -- omitted 657 rows ]
> relation<-lm(data$Age~data$Outcome+data$BMI)
> relation

Call:
lm(formula = data$Age ~ data$Outcome + data$BMI)

Coefficients:
 (Intercept)  data$Outcome       data$BMI
    32.84734       6.14177      -0.05469

> relation<-lm(data$Age~data$Outcome)
> relation

Call:
lm(formula = data$Age ~ data$Outcome)

Coefficients:
 (Intercept)  data$Outcome
      31.190         5.877
```

26.Implement using WEKA for the given Suppose a database has five transactions. Let min sup= 50%(2) and min con f = 80%.

Transactions	**Items**
T1	(M, O, N, K, E, Y)
T2	(D, O, N, K, E, Y)
T3	(M, A, K, E)
T4	(M, U, C, K, Y)
T5	(C,O, O, K, I ,E)

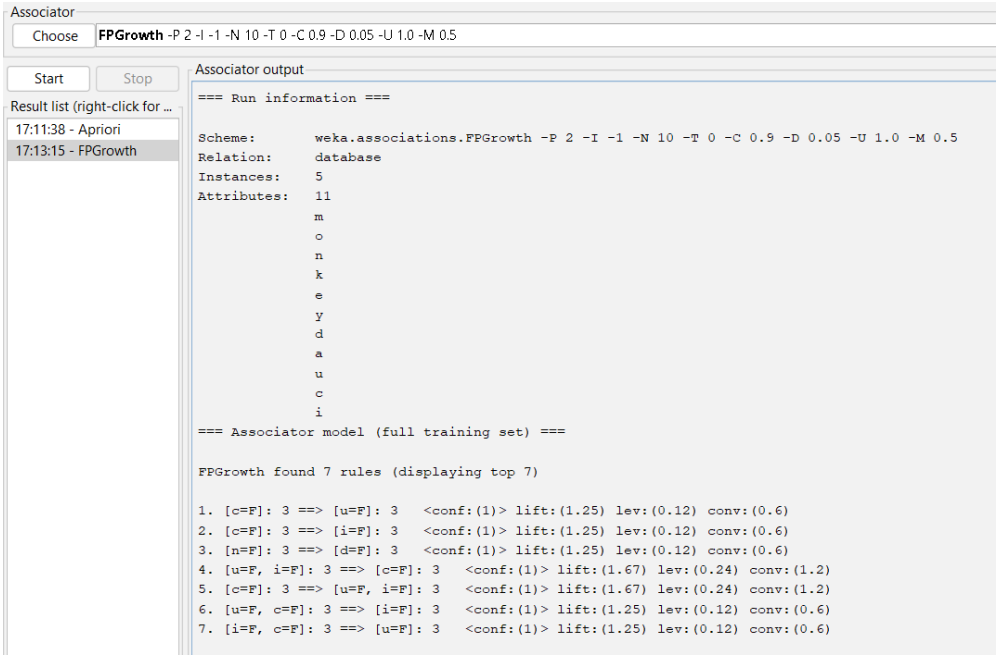
- Find all frequent item sets using Apriori algorithm
- Also draw FP-Growth Tree



Input:

Apriori algorithm:

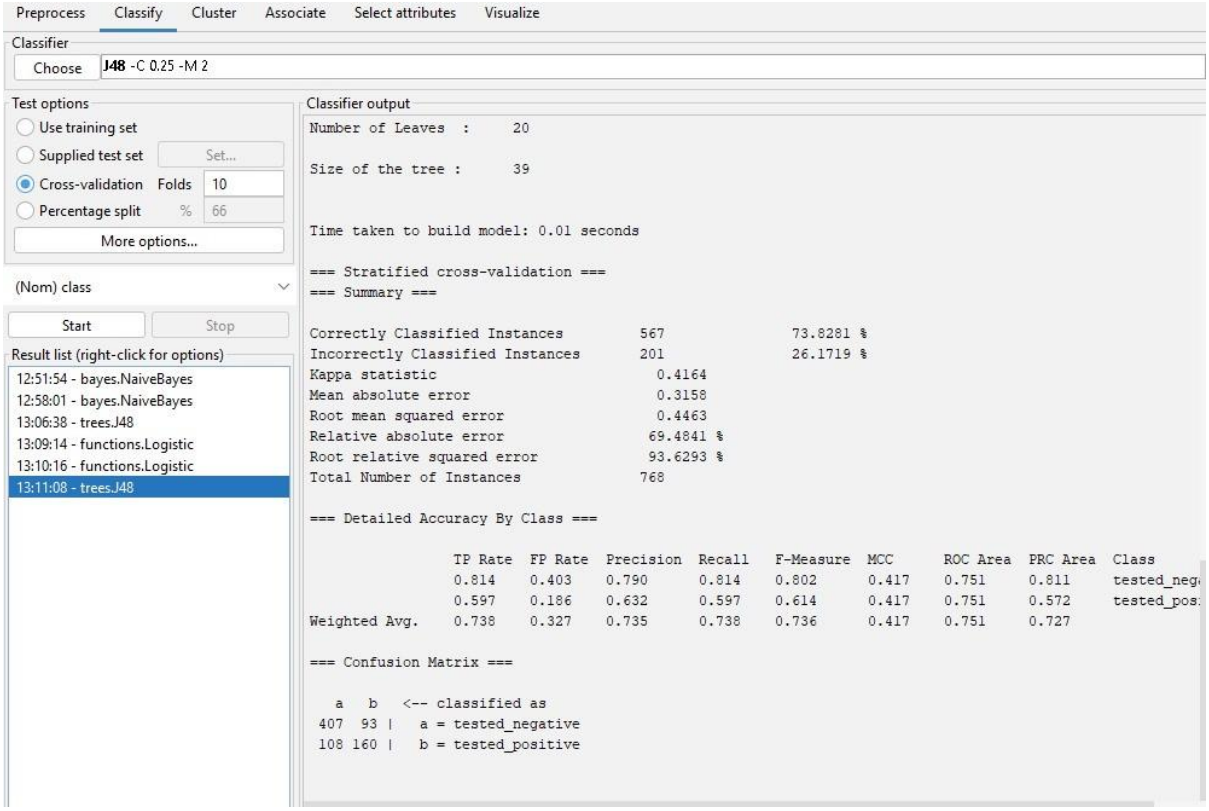
Fpgrowth algorithm:



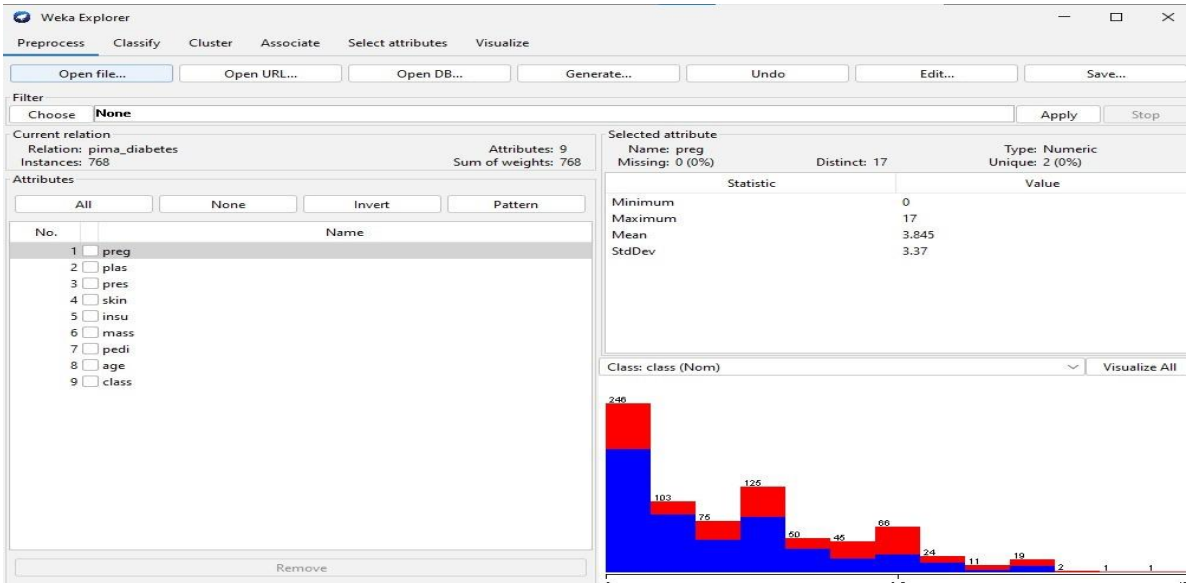
27. Prediction of Categorical Data using Decision Tree Algorithm through WEKA using any datasets. a) Tree b) Preprocess c) Logistic

Output:

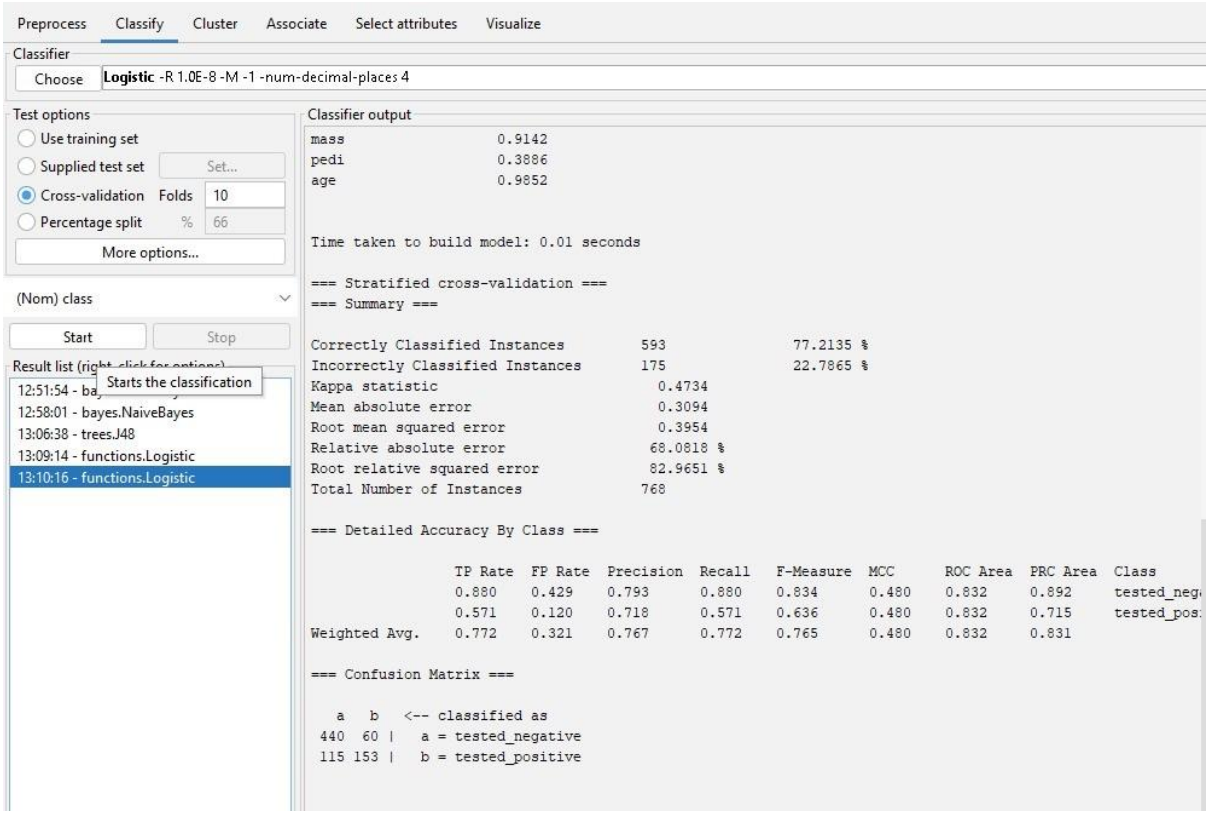
Tree:



Preprocessor:



Logistic:



28.Create the dataset using ARFF file format:

Transaction ID	Items
T1	Hot Dogs, Buns, Ketchup
T2	Hot Dogs, Buns
T3	Hot Dogs, Coke, Chips
T4	Chips, Coke
T5	Chips, Ketchup
T6	Hot Dogs, Coke, Chips

a.Find the **frequent itemsets** and generate **association rules** on this. Assume that minimum support threshold (s = 33.33%) and minimum confident threshold (c = 60%).

b.List the various rule generated by apriori and FP tree algorthim ,mention wheather accepted or rejcted.

Input:

@relation hotdogs

@attribute hotdogs{t,f}

@attribute buns{t,f}

@attribute ketchup{t,f}

@attribute coke{t,f}

@attribute chips{t,f}

@data

t t t f f

t t f f f

t f f t t

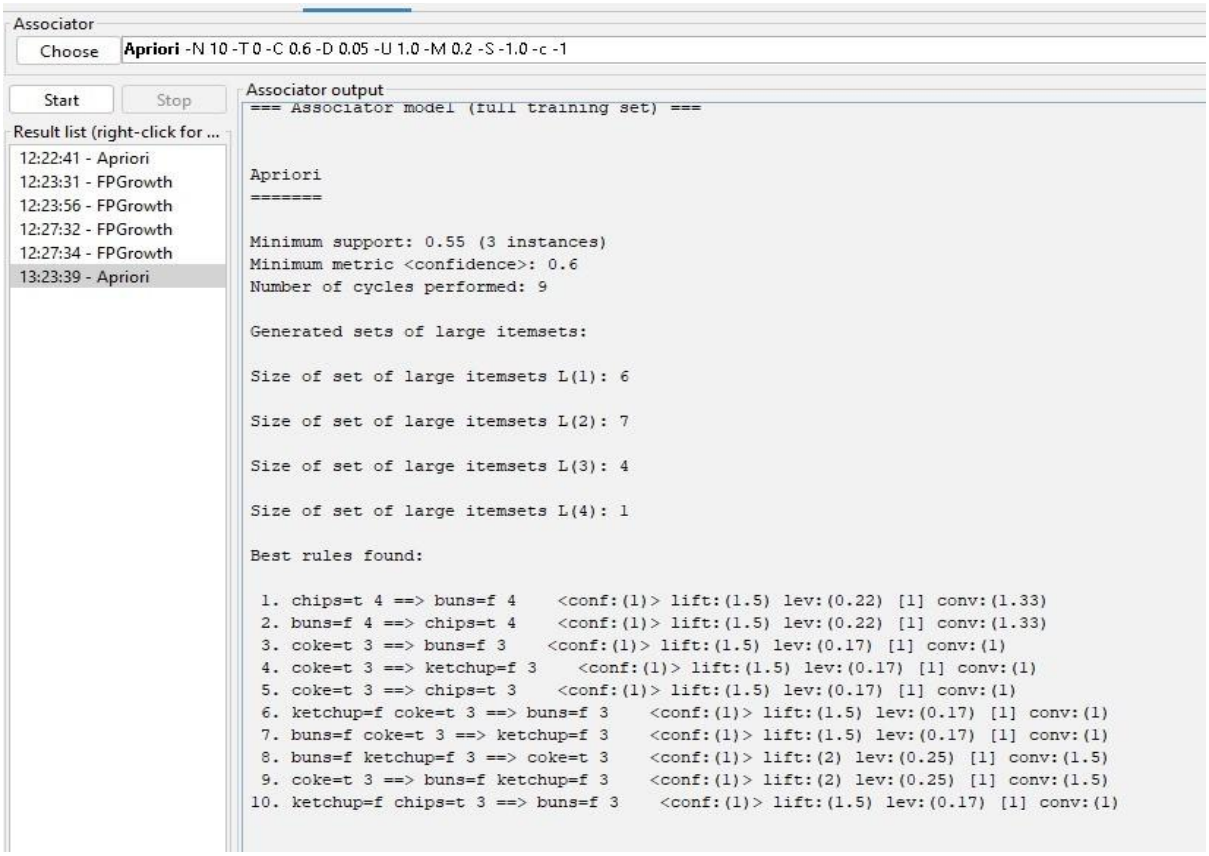
f f f t t

f f t f t

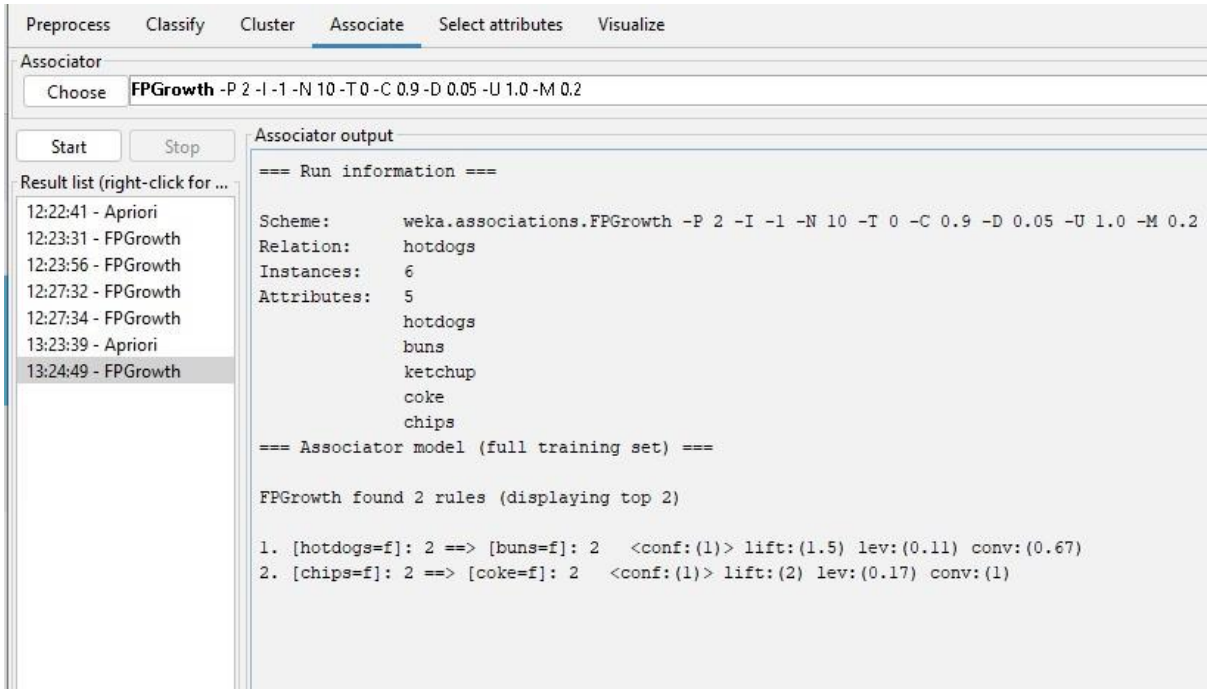
t f f t t

output:

apriori algorithm:



Fp growth:



29.Prediction of Categorical Data using Rule base classification and decision tree classification through WEKA using any datasets. Compare the accuracy using two algorithm and plot the graph

Input:

@relation decision_tree

@attribute age{young,middle,old}

@attribute income{low,medium,high}

@attribute student{yes,no}

@attribute Creit_rating{fair,excellent}

@attribute class{yes,no}

@data

young high no fair no

young high no excellent no

middle high no fair yes

old medium no fair yes

old low yes fair yes

old low yes excellent no

middle low yes excellent yes

young medium no fair no

young low yes fair yes

old medium yes fair yes

young medium yes excellent yes

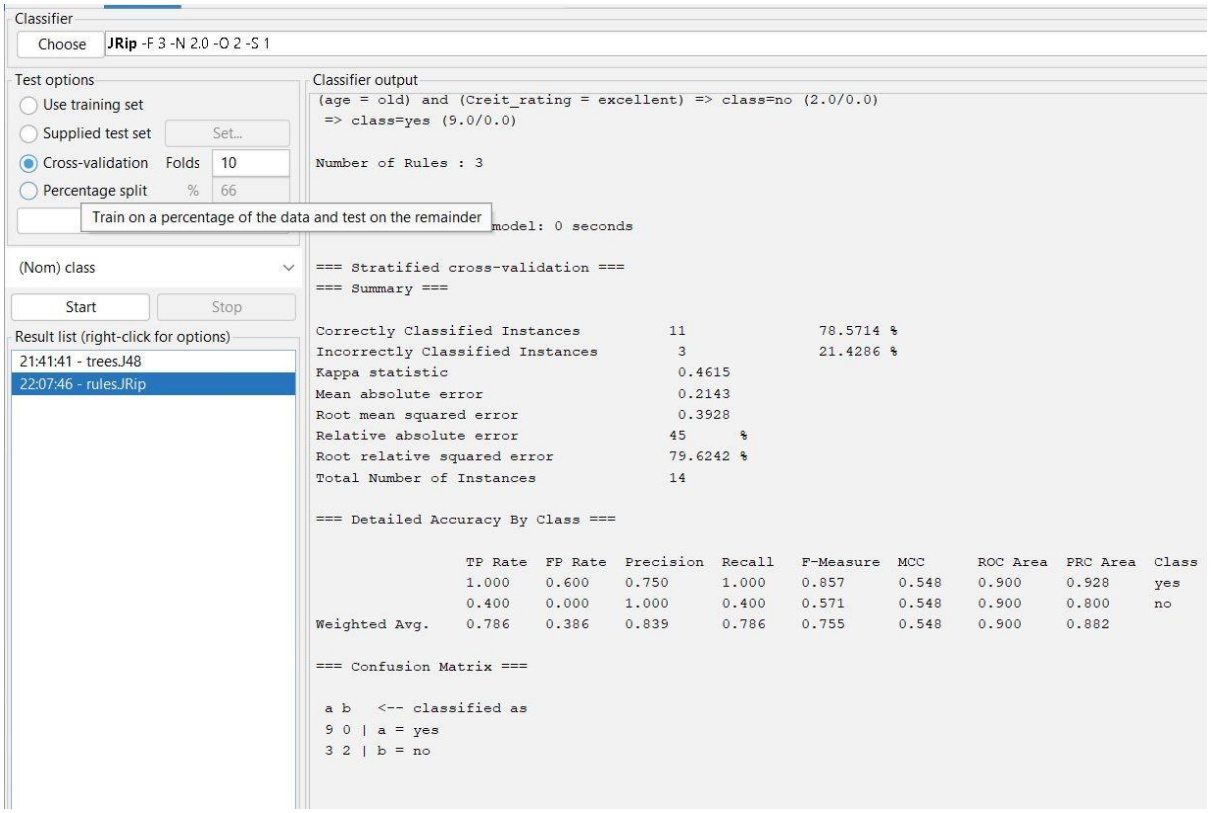
middle medium no excellent yes

middle high yes fair yes

old medium no excellent no

Output:

Rule based classification:



Decision tree: