Assignmet 1 of course that was assigned

Probability and statitics (National University of Computer and Emerging Sciences)

Name: Saad Ullah Khan

Roll Number: 19I-0474

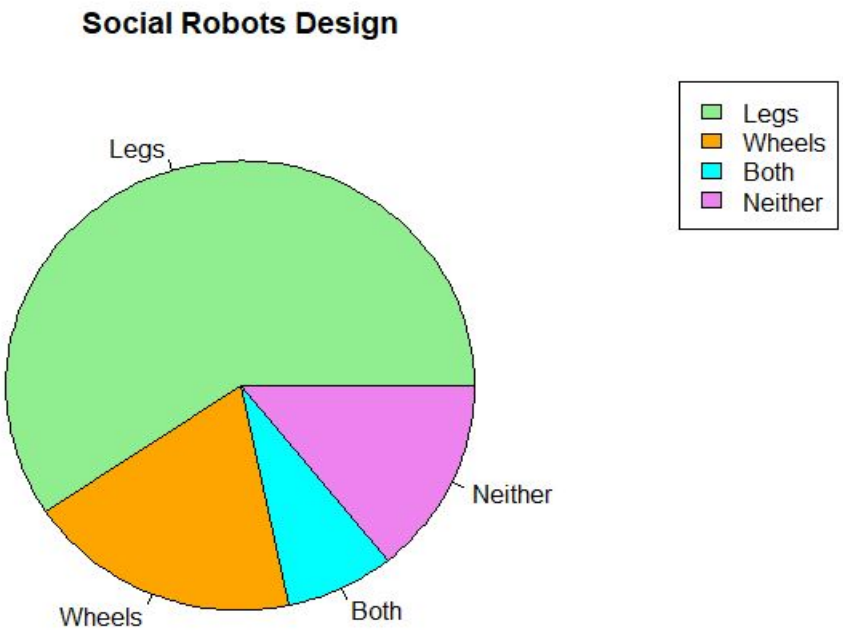
Class: CS-F

Q1:

R-CODE:

```
Divisions = c("Legs","Wheels","Both","Neither")

piedata = c (63,20,8,15)

piecolors = c("light green","orange","cyan","violet")

pie (piedata,Divisions,main="Social Robots Design",col = piecolors)

legend ("topright",Divisions,fill = piecolors)
```

Output:



Conclusion:

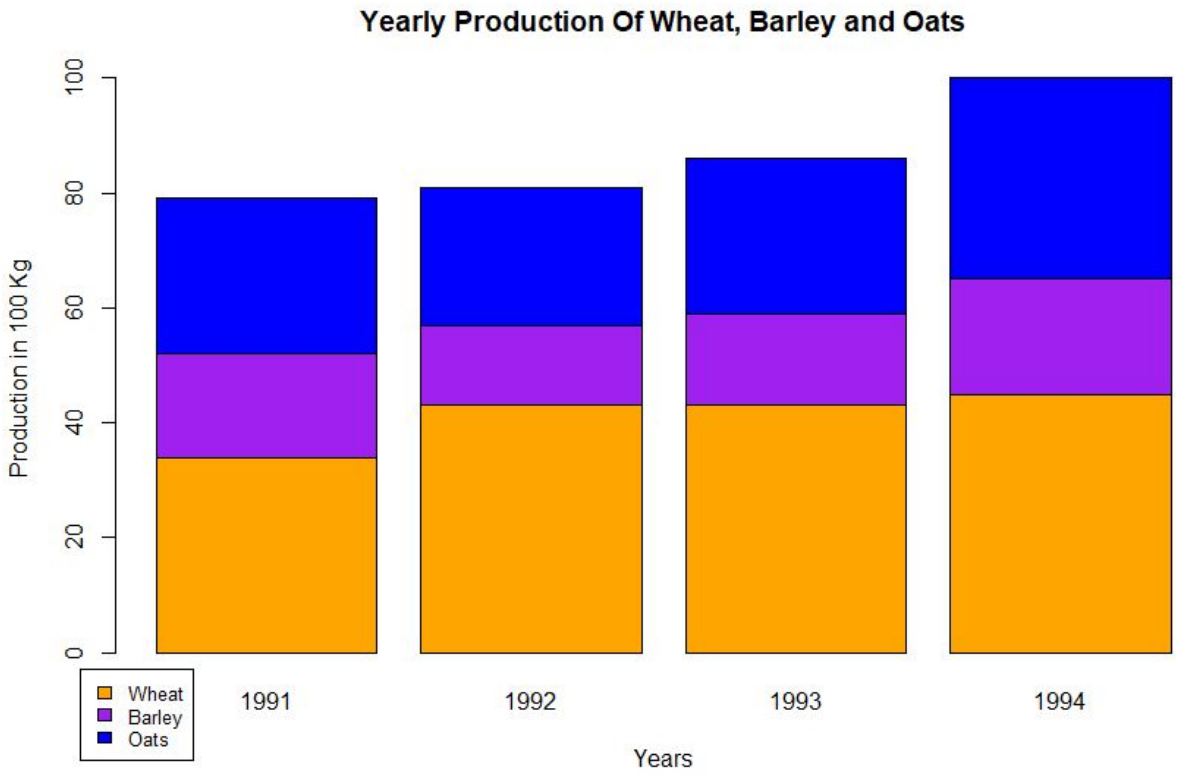
Most social robots are walking robots, some have wheels, some have none and a few have both wheels and legs.

Q2:

(i)R-CODE:

```
Year = c("1991","1992","1993","1994")

Wheat = c( 34,43,43,45 )

Barley = c( 18,14,16,20 )

Oats = c( 27,24,27,35 )

barcolors = c("orange","purple","blue")

barplot (rbind (Wheat,Barley,Oats), main= "Yearly Production Of Wheat, Barley and Oats", names.arg= Year,col=barcolors,xlab = "Years",ylab = "Production in 100 Kg")

legend ("topright",c("Wheat","Barley","Oats"),xpd = TRUE,inset = c(0.93,1.02),cex = .8,fill= barcolors)
```

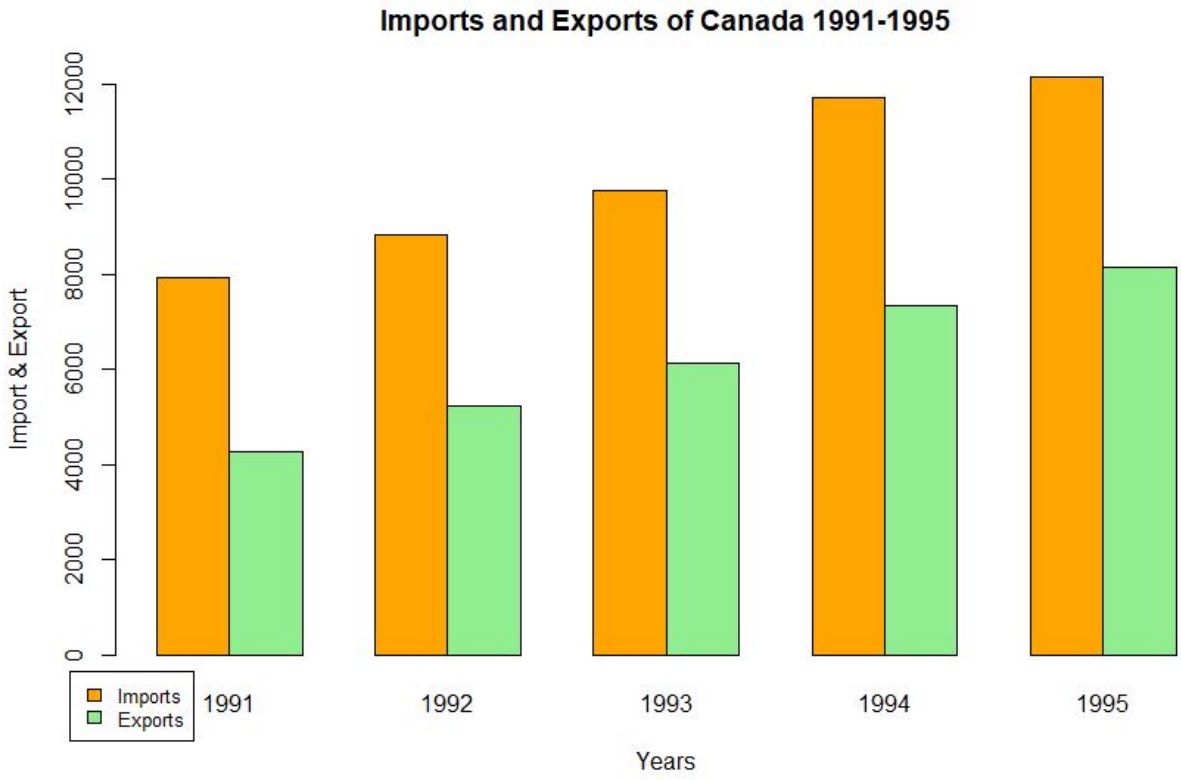
Output:



(ii)R-CODE:

```
Year = c("1991","1992","1993","1994","1995")

Imports = c( 7930,8850,9780,11720,12150 )

Exports = c( 4260,5225,6150,7340,8145 )

BarColors = c("orange","lightgreen")

barplot (rbind (Imports,Exports), main= "Imports and Exports of Canada 1991-1995", names.arg= Year,col = BarColors,xlab = "Years",ylab = "Import & Export",beside = TRUE)

legend ("topright",c("Imports","Exports"),xpd = TRUE,inset = c(0.93,1.02),cex = 0.8,fill = BarColors)
```

Output:



(iii)R-CODE:

```
library(ggplot2)

library(dplyr)

View(diamonds)

str(diamonds)
```

Output:

```
> library(ggplot2)
> library(dplyr)
> view(diamonds)
> str(diamonds)
tibble [53,940 x 10] (S3: tbl_df/tbl/data.frame)
 $ carat  : num [1:53940] 0.23 0.21 0.23 0.29 0.31 0.24 0.24 0.26 0.22 0.23 ...
 $ cut    : Ord.factor w/ 5 levels "Fair"<"Good"<..: 5 4 2 4 2 3 3 3 1 3 ...
 $ color  : Ord.factor w/ 7 levels "D"<"E"<"F"<"G"<..: 2 2 2 6 7 7 6 5 2 5 ...
 $ clarity: Ord.factor w/ 8 levels "I1"<"SI2"<"SI1"<..: 2 3 5 4 2 6 7 3 4 5 ...
 $ depth  : num [1:53940] 61.5 59.8 56.9 62.4 63.3 62.8 62.3 61.9 65.1 59.4 ...
 $ table  : num [1:53940] 55 61 65 58 58 57 57 55 61 61 ...
 $ price  : int [1:53940] 326 326 327 334 335 336 336 337 337 338 ...
 $ x      : num [1:53940] 3.95 3.89 4.05 4.2 4.34 3.94 3.95 4.07 3.87 4 ...
 $ y      : num [1:53940] 3.98 3.84 4.07 4.23 4.35 3.96 3.98 4.11 3.78 4.05 ...
 $ z      : num [1:53940] 2.43 2.31 2.31 2.63 2.75 2.48 2.47 2.53 2.49 2.39 ...
>
```

diamonds

Filter

	carat	cut	color	clarity	depth	table	price	x	y	z
1	0.23	Ideal	E	SI2	61.5	55.0	326	3.95	3.98	2.43
2	0.21	Premium	E	SI1	59.8	61.0	326	3.89	3.84	2.31
3	0.23	Good	E	VS1	56.9	65.0	327	4.05	4.07	2.31
4	0.29	Premium	I	VS2	62.4	58.0	334	4.20	4.23	2.63
5	0.31	Good	J	SI2	63.3	58.0	335	4.34	4.35	2.75
6	0.24	Very Good	J	VVS2	62.8	57.0	336	3.94	3.96	2.48
7	0.24	Very Good	I	VVS1	62.3	57.0	336	3.95	3.98	2.47
8	0.26	Very Good	H	SI1	61.9	55.0	337	4.07	4.11	2.53
9	0.22	Fair	E	VS2	65.1	61.0	337	3.87	3.78	2.49
10	0.23	Very Good	H	VS1	59.4	61.0	338	4.00	4.05	2.39
11	0.30	Good	J	SI1	64.0	55.0	339	4.25	4.28	2.73
12	0.23	Ideal	J	VS1	62.8	56.0	340	3.93	3.90	2.46
13	0.22	Premium	F	SI1	60.4	61.0	342	3.88	3.84	2.33
14	0.31	Ideal	J	SI2	62.2	54.0	344	4.35	4.37	2.71
15	0.20	Premium	E	SI2	60.2	62.0	345	3.79	3.75	2.27
16	0.32	Premium	E	I1	60.9	58.0	345	4.38	4.42	2.68
17	0.30	Ideal	I	SI2	62.0	54.0	348	4.31	4.34	2.68
18	0.30	Good	J	SI1	63.4	54.0	351	4.23	4.29	2.70
19	0.30	Good	J	SI1	63.8	56.0	351	4.23	4.26	2.71
20	0.30	Very Good	J	SI1	62.7	59.0	351	4.21	4.27	2.66
21	0.30	Good	I	SI2	63.3	56.0	351	4.26	4.30	2.71
22	0.23	Very Good	E	VS2	63.8	55.0	352	3.85	3.92	2.48
23	0.23	Very Good	H	VS1	61.0	57.0	353	3.94	3.96	2.41
24	0.31	Very Good	J	SI1	59.4	62.0	353	4.39	4.43	2.62
25	0.31	Very Good	J	SI1	58.1	62.0	353	4.44	4.47	2.59
26	0.23	Very Good	G	VVS2	60.4	58.0	354	3.97	4.01	2.41
27	0.24	Premium	I	VS1	62.5	57.0	355	3.97	3.94	2.47
28	0.30	Very Good	J	VS2	62.2	57.0	357	4.28	4.30	2.67
29	0.23	Very Good	D	VS2	60.5	61.0	357	3.96	3.97	2.40
30	0.23	Very Good	F	VS1	60.9	57.0	357	3.96	3.99	2.42
31	0.23	Very Good	F	VS1	60.0	57.0	402	4.00	4.03	2.41

(iii)Relationship:

Cut means Diamond's cut which defines its luminance and quality. Price and Cut are direct relationship as cut is brilliant the price of diamond will be really high and if cut is poor the price will be very low.

(iv)Relationship:

Diamond's volume (Carat) is the most significant for predicting the price of Diamond. More carats mean more price.

Q3:

(i)&(ii)R-CODE:

```
data <-
c(28,28,30,39,35,33,28,31,34,39,25,27,21,20,19,19,18,19,16,20,19,18,18,19,27,17,18,22,21,18,29,29,23,20,31,32,16,26,21,21,20,22,24,28,30,24,33,35,29,23)

Maxval<-max(data)

Minval<-min(data)

Avg<-(Maxval-Minval)

A=1+3.322*log10(50)

B<-Avg/A

intervals<-round(seq(Minval,Maxval+B,B),0)

intervals

Classes<-cut(data,intervals,right=F);

Frequency=table(Classes)

CommultaiveFreq = cumsum(Frequency)

cf<-sum(Frequency)

RelativeFreq = Frequency/cf

i<-1:A

MidPoints<-round(c(intervals[i]+(B/2)),0)

output<-cbind(Frequency,CommultaiveFreq,RelativeFreq,MidPoints)

output
```

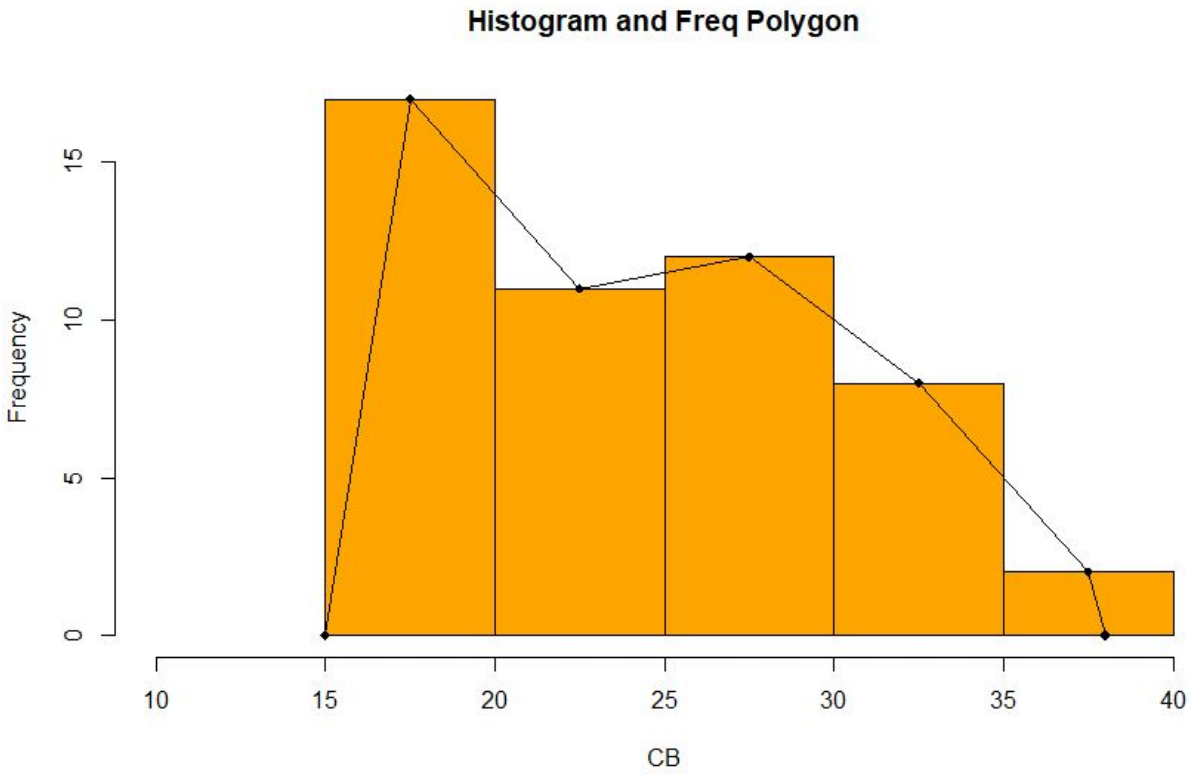
Output:

```
> data <- c(28,28,30,39,35,33,28,31,34,39,25,27,21,20,19,19,18,19,16,20,19,18,18,19,27,17,18,22,21,18,29,29,23,20,31,32,16,2
6,21,21,20,22,24,28,30,24,33,35,29,23)
> Maxval<-max(data)
> Minval<-min(data)
> Avg<-(Maxval-Minval)
> A=1+3.322*log10(50)
> B<-Avg/A
> intervals<-round(seq(Minval,Maxval+B,B),0)
> intervals
[1] 16 19 23 26 30 33 37 40
> Classes<-cut(data,intervals,right=F);
> Frequency=table(Classes)
> CommultaiveFreq = cumsum(Frequency)
> cf<-sum(Frequency)
> RelativeFreq = Frequency/cf
> i<-1:A
> MidPoints<-round(c(intervals[i]+(B/2)),0)
> output<-cbind(Frequency,CommultaiveFreq,RelativeFreq,MidPoints)
Warning message:
In cbind(Frequency, CommultaiveFreq, RelativeFreq, MidPoints) :
  number of rows of result is not a multiple of vector length (arg 4)
> output
        Frequency CommultaiveFreq RelativeFreq MidPoints
[16,19)         8               8         0.16        18
[19,23)        15              23         0.30        21
[23,26)         5              28         0.10        25
[26,30)        10              38         0.20        28
[30,33)         5              43         0.10        32
[33,37)         5              48         0.10        35
[37,40)         2              50         0.04        18
>
```

(iii)R-CODE:

```
Histogram<-hist(data, main="Histogram and Freq Polygon", xlab="CB",ylab="Frequency", col = "orange", xlim=c(10,40))

Histogram<-lines(c(15,Histogram$mids, 38),c(0,Histogram$counts,0),lwd=1.5,pch=18,type="o",xlim=c(10,40))
```

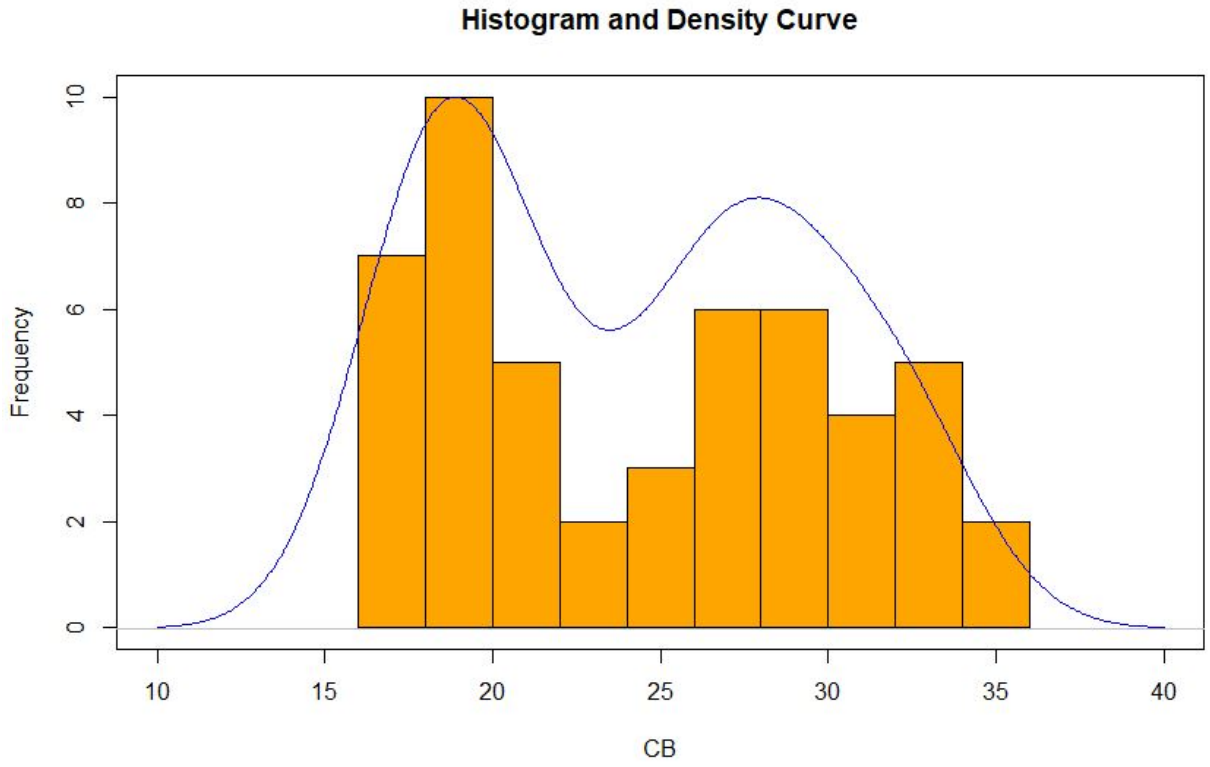
Output:



(iv)R-CODE:

```
Histogram<-hist(data, main="Histogram and Density Curve", xlab="CB",ylab="Frequency", col="orange", xlim=c(10,40))

par(new = T)

plot(density(data),  main = "",xaxt='n' ,yaxt = 'n', ann=FALSE,col="blue")
```

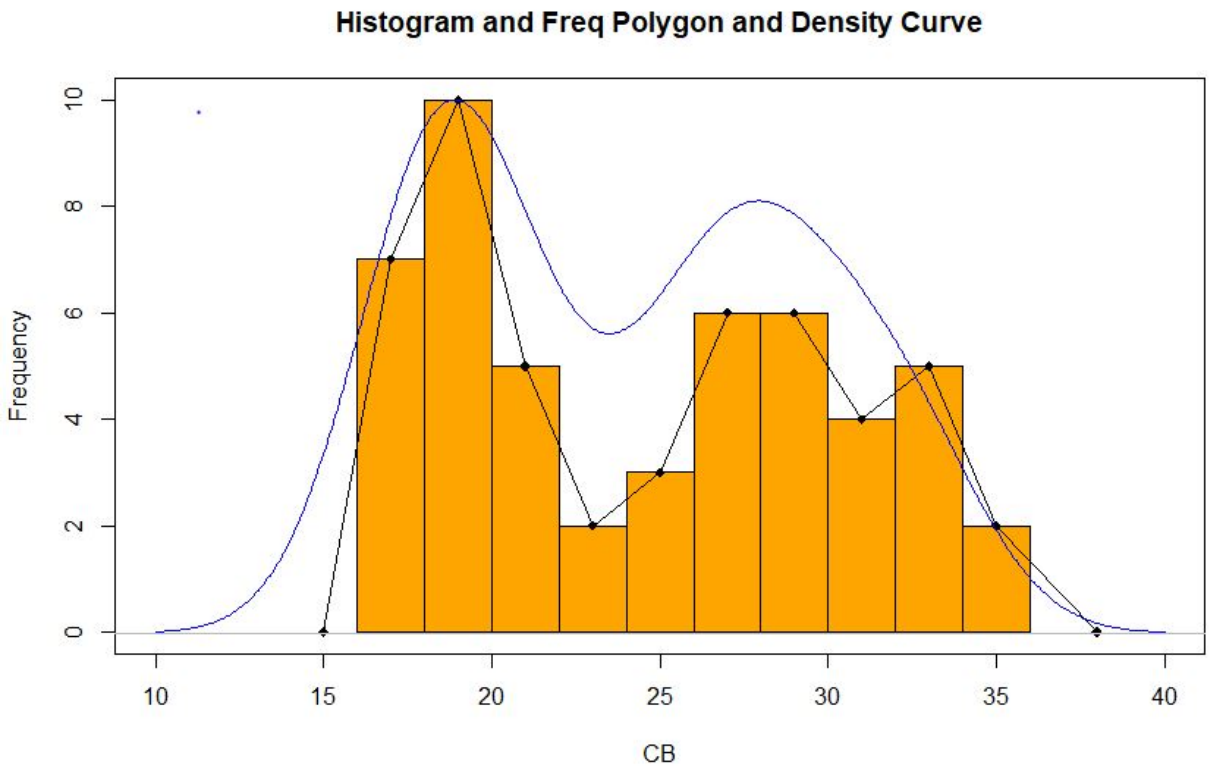
Output:



(v)R-CODE:

```
Histogram<-hist(data, main="Histogram and Freq Polygon and Density Curve", xlab="CB",ylab="Frequency", col="orange", xlim=c(10,40))

par(new = T)

Histogram<-lines(c(15,Histogram$mids, 38),c(0,Histogram$counts,0),lwd=1.5,pch=18,type="o",xlim=c(15,40))

par(new = T)

plot(density(data),  main = "",xaxt='n' ,yaxt = 'n', ann=FALSE,col="blue")
```

Output:



(vi)R-CODE:

```
class_width = seq(Minval,Maxval+B,by=B)

data.cut = cut(data, class_width, right=FALSE)

data.freq = table(data.cut)

cbind(data.freq)

cumfreq = c(0, cumsum(data.freq))

plot(class_width, cumfreq, main="Ogives", xlab="Class Width",ylab="Frequency",xlim = c(Minval-B,Maxval+B),ylim = c(0,50))


lines(class_width,cumfreq)
```

Output: