Question No .01

Input

```r
y<-c(40,67,75,48,44,53,56,43,66,57,65,52,83,83,80,76,85,88,89,87)
y
X = mean(y)
X
median(y)
ty=table(y)
ty
m=which(ty==max(ty))
m
stx=sort(unique(y))
stx
mode=stx[m]
mode
q1= quantile(y,0.25)
q1
q2=quantile(y,0.5)
q2
q3=quantile(y,0.75)
q3
range=(max(y)-min(y))
range
var(y)
sd=sqrt(var(y))
sd
cm1 =sum(y-(mean(y)))/length(y)
cm1
cm2 =(sum(y-mean(y)))^2/length(y)
cm2
cm3=(sum(y-mean(y)))^3/length(y)
cm3
cm4=(sum(y-mean(y)))^4/length(y)
cm4
b1=(cm3)^2/(cm2)^3 #skewness
b1
b2=cm4/(cm2)^2 #kurtosis
b2

```

Out put

```
> y<-c(40,67,75,48,44,53,56,43,66,57,65,52,83,83,80,76,85,88,89,87)
> y
 [1] 40 67 75 48 44 53 56 43 66 57 65 52 83 83 80 76 85 88 89 87
> X = mean(y)
> X
[1] 66.85
> median(y)
[1] 66.5
> ty=table(y)
> ty
y
40 43 44 48 52 53 56 57 65 66 67 75 76 80 83 85 87 88 89
 1  1  1  1  1  1  1  1  1  1  1  1  1  1  2  1  1  1  1
> m=which(ty==max(ty))
> m
83
15
> stx=sort(unique(y))
> stx
 [1] 40 43 44 48 52 53 56 57 65 66 67 75 76 80 83 85 87 88 89
> mode=stx[m]
> mode
[1] 83
> q1= quantile(y,0.25)
> q1
  25%
52.75
> q2=quantile(y,0.5)
> q2
 50%
66.5
> q3=quantile(y,0.75)
> q3
75%
 83
> range=(max(y)-min(y))
> range
[1] 49
> var(y)
```

```
> var(y)
[1] 279.8184
> sd=sqrt(var(y))
> sd
[1] 16.72777
> cm1 =sum(y-(mean(y)))/length(y)
> cm1
[1] 5.684342e-15
> cm2 =(sum(y-mean(y)))^2/length(y)
> cm2
[1] 6.462349e-28
> cm3=(sum(y-mean(y)))^3/length(y)
> cm3
[1] 7.34684e-41
> cm4=(sum(y-mean(y)))^4/length(y)
> cm4
[1] 8.35239e-54
> b1=(cm3)^2/(cm2)^3 #skewness
> b1
[1] 20
> b2=cm4/(cm2)^2 #kurtosis
> b2
[1] 20
>
```

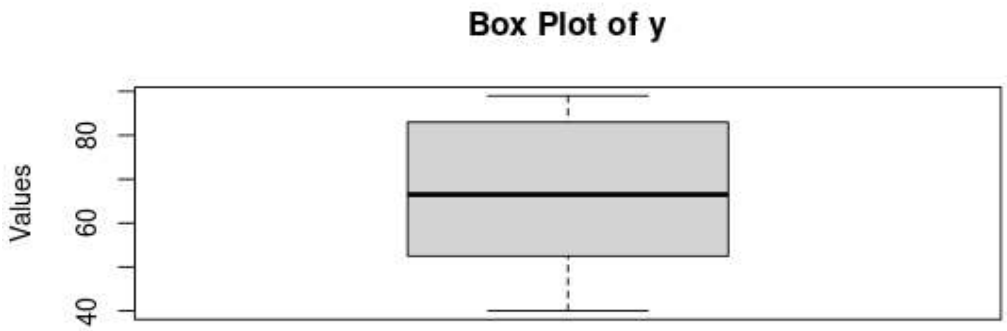
Question .2

Input

```
y <- c(40, 67, 75, 48, 44, 53, 56, 43, 66, 57, 65, 52, 83, 83, 80, 76, 85, 88, 89, 87)
y
coefficient_of_variation <- (sd(y) / mean(y)) * 100
cat("Coefficient of Variation:", coefficient_of_variation, "\n")

boxplot(y, main="Box Plot of y", ylab="Values")
```

Out put

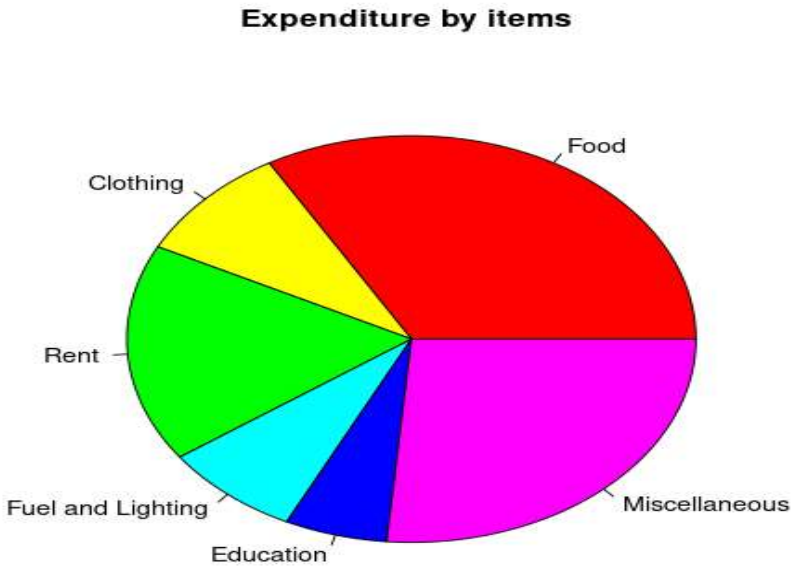
```
> y <- c(40, 67, 75, 48, 44, 53, 56, 43, 66, 57, 65, 52, 83, 83, 80, 76, 85, 88, 89, 87)
> y
 [1] 40 67 75 48 44 53 56 43 66 57 65 52 83 83 80 76 85 88 89 87
> coefficient_of_variation <- (sd(y) / mean(y)) * 100
> cat("Coefficient of Variation:", coefficient_of_variation, "\n")
Coefficient of Variation: 25.02285
> boxplot(y, main="Box Plot of y", ylab="Values")
>
```



Question no .03
Input

```
items <- c("Food", "Clothing", "Rent", "Fuel and Lighting", "Education", "Miscellaneous")
expenditures <- c(240, 66, 125, 57, 42, 190)
pie(expenditures, labels = items, main = "Expenditure by items ", col = rainbow(length(expenditures)))
```

Out put

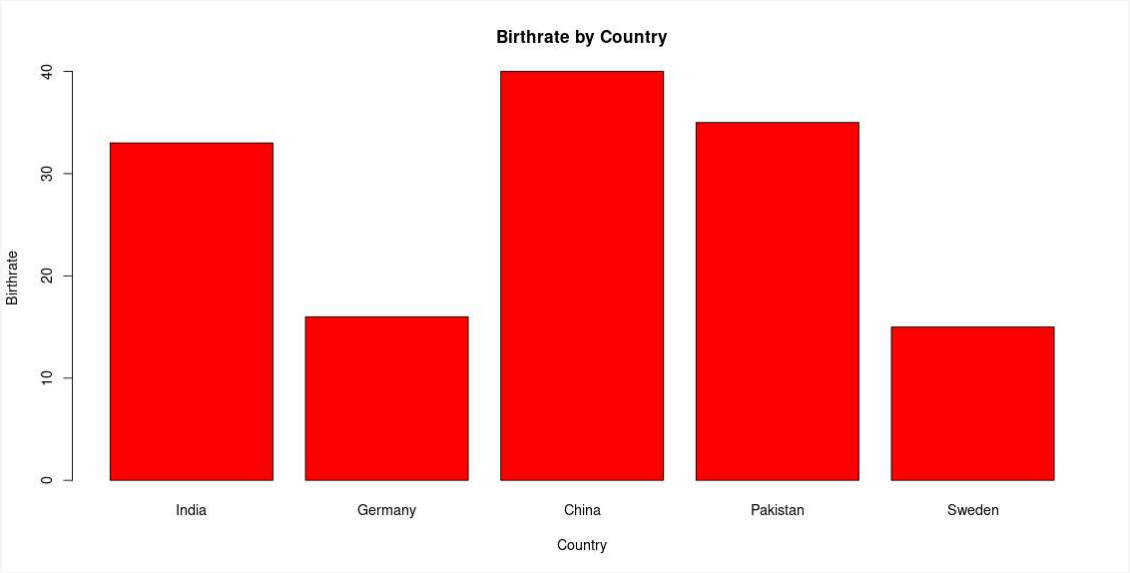


Question No .04

Input

```
country <- c("India", "Germany", "China", "Pakistan", "Sweden")
birthrate <- c(33, 16, 40, 35, 15)
barplot(birthrate, names.arg = country, main = "Birthrate by Country", xlab = "Country", ylab = "Birthrate", col = "red")

```

Out

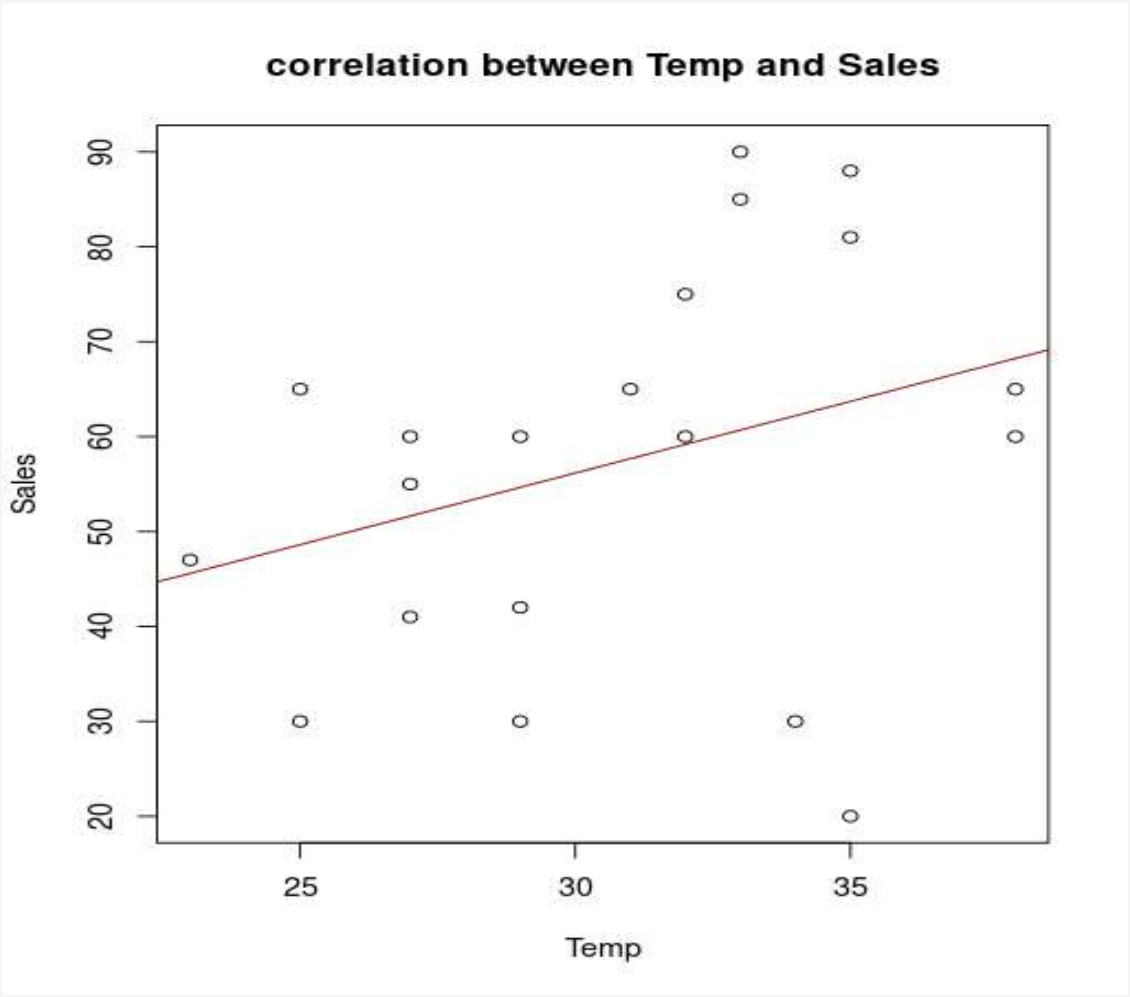


Question no.10

Input

```
temp=c(23,32,25,35,32,35,33,27,27,29,35,33,29,25,31,34,27,38,29,38)
sales=c(47,75,30,88,60,81,85,60,41,42,20,90,30,65,65,30,55,65,60,60)
plot(temp,sales,main="correlation between Temp and Sales",xlab="Temp",ylab="Sales")
abline(lm(sales~temp),col="darkred")
#correlation
cor(temp,sales,method="pearson")
cor(temp,sales,method="spearman")
```

Out put

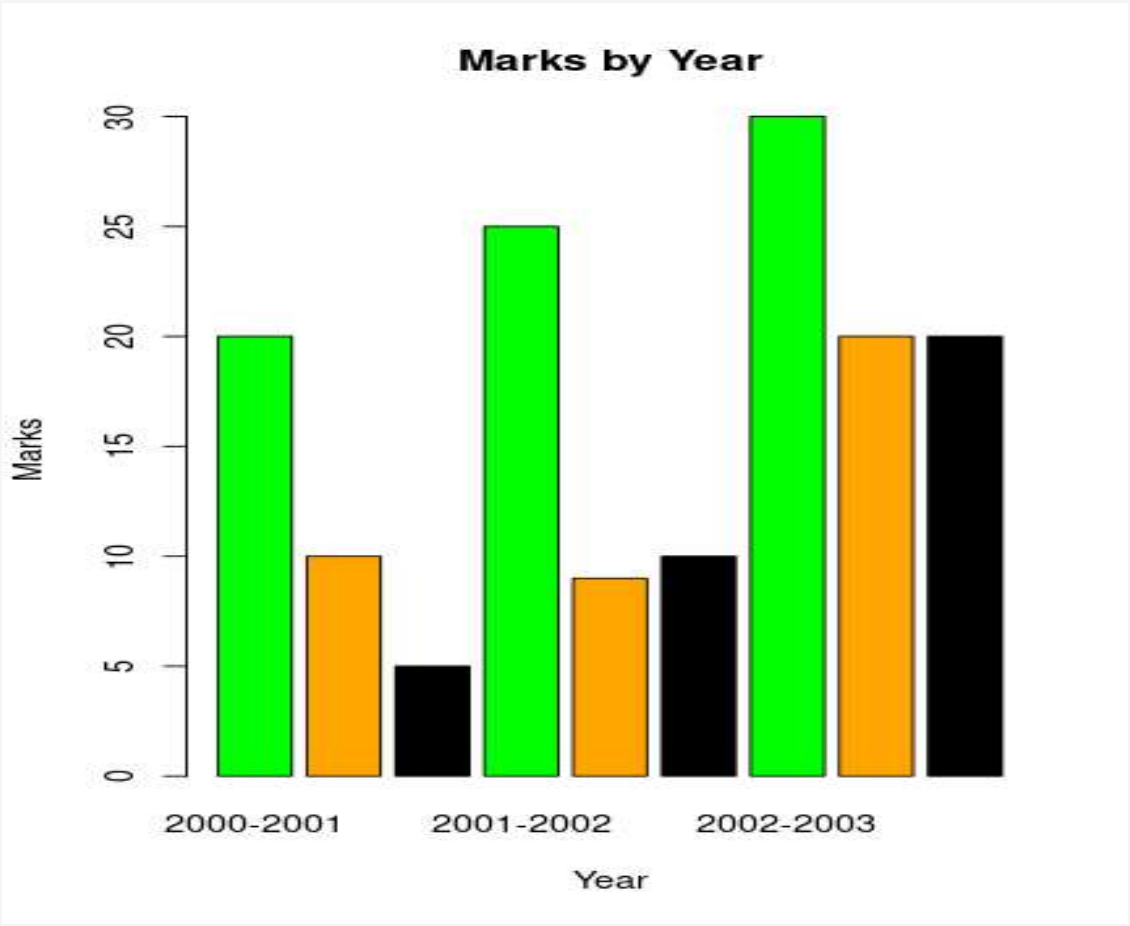


Question .no .05

Input

```
year <- c("2000-2001", "2000-2001", "2000-2001", "2001-2002", "2001-2002", "2001-2002", "2002-2003", "2002-2003", "2002-2003")

marks <- c(20, 10, 5, 25, 9, 10, 30, 20, 20)

stream <- c("Arts", "Science", "Low", "Arts", "Science", "Low", "Arts", "Science", "Law")

barplot(marks, names.arg = year, main = "Marks by Year", xlab = "Year", ylab = "Marks", col = ifelse(stream == "Arts", "green", ifelse(stream == "Science", "orange", "black")))
```

Output

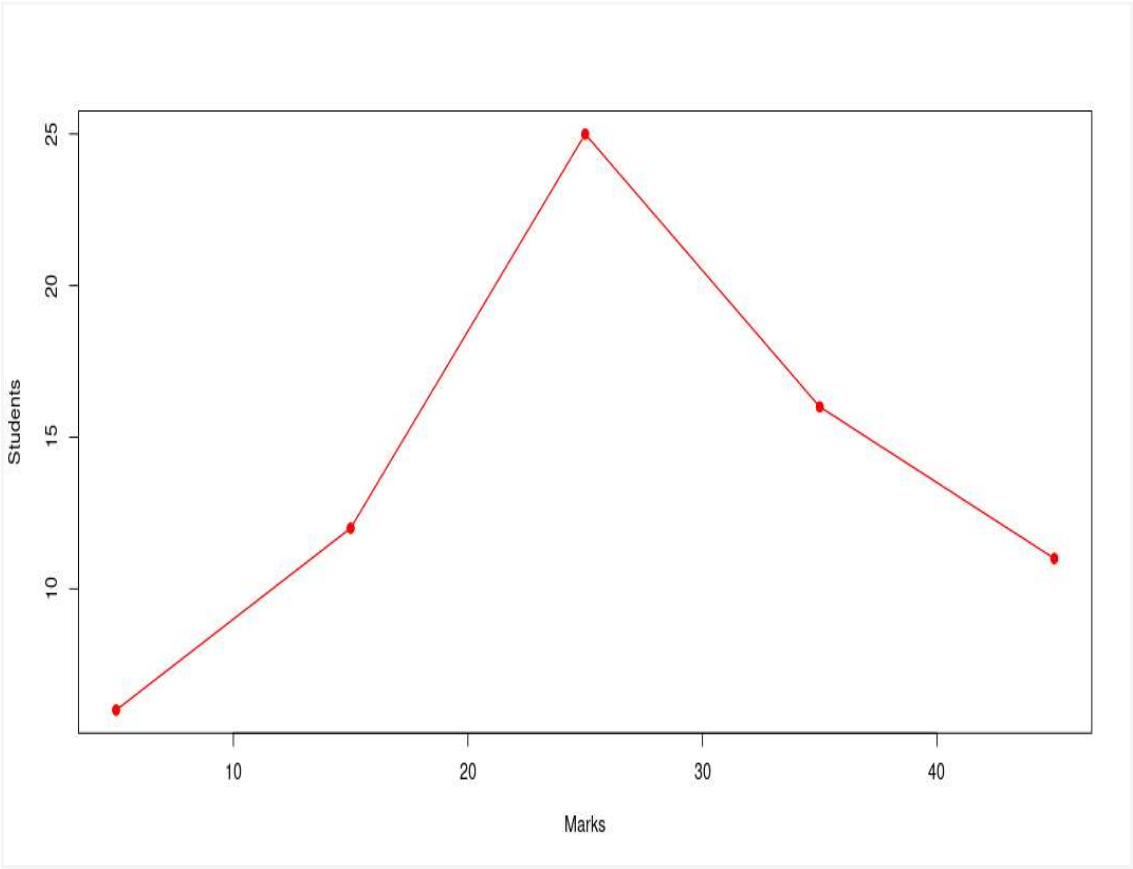


Question no. 06

Input

```
marks <- c(5, 15, 25, 35, 45)

students <- c(6, 12, 25, 16, 11)

plot(marks, students, type = "o", pch = 19, col = "Red", xlab = "Marks", ylab = "Students")lines(marks, students, type = "o", pch = 19, col = "Red")
```

Output

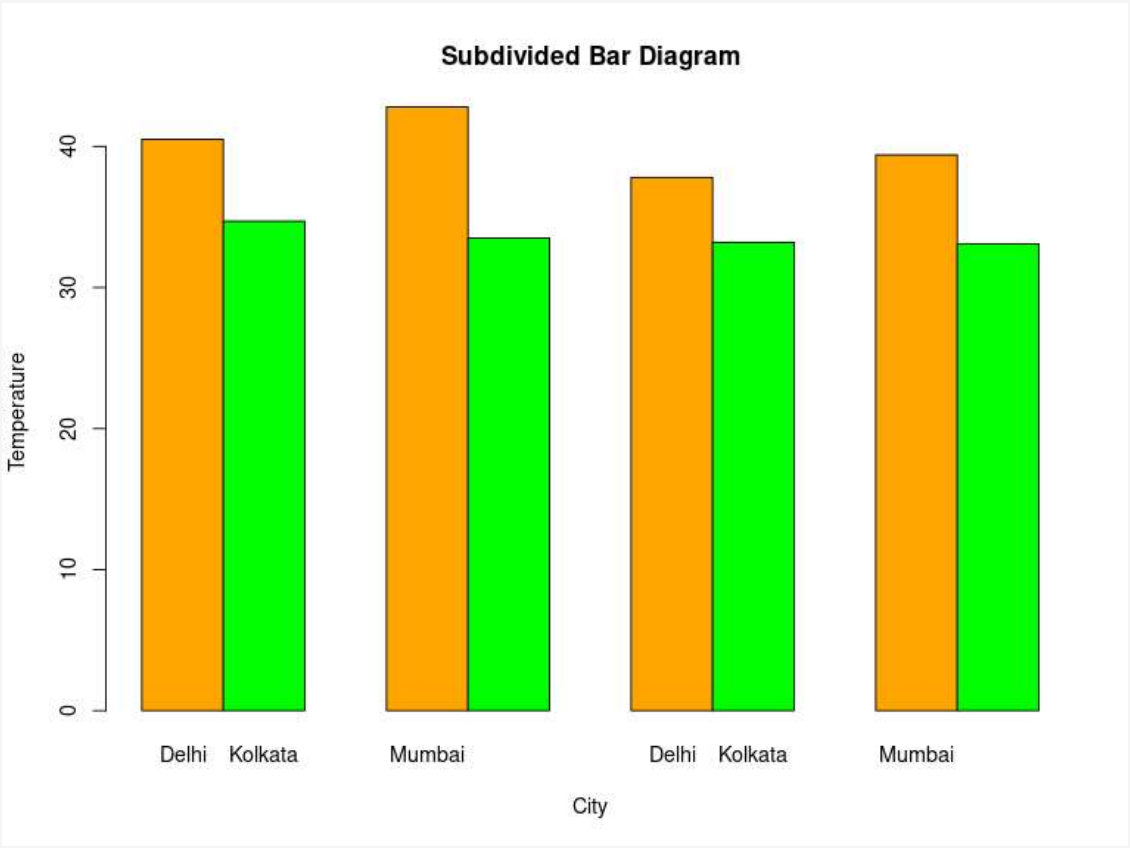


Question no. 07

Input

```
city <- c("Delhi", "Kolkata", "Mumbai", "Chennai", "Delhi", "Kolkata", "Mumbai", "Chennai")

temperature <- c(40.5, 42.8, 37.8, 39.4, 34.7, 33.5, 33.2, 33.1)

Level <- c("Max", "Max", "Max", "Max", "Min", "Min", "Min", "Min")

barplot(matrix(temperature, nrow = 2, byrow = TRUE), beside = TRUE, col = c("orange", "green"),
names.arg = city, main = "Subdivided Bar Diagram", xlab = "City", ylab ="Temperature")
```

Output



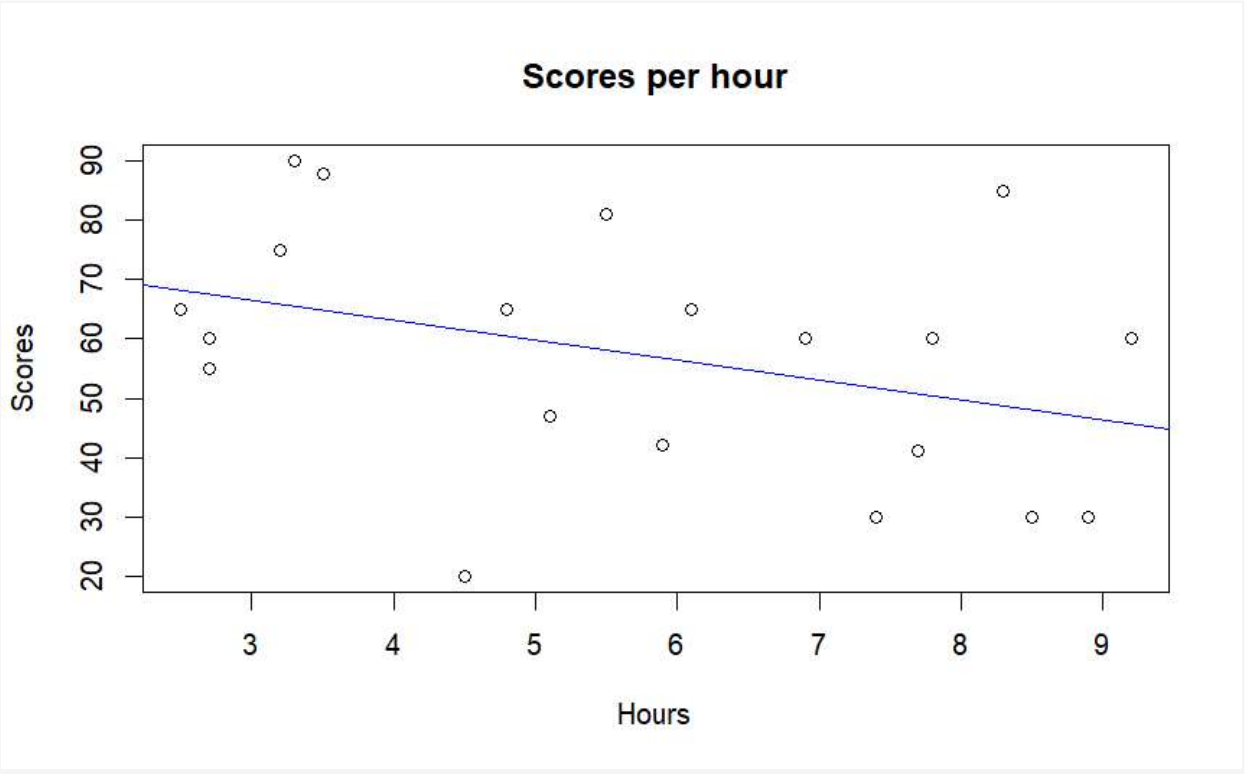
Question no .08

Input part (a)

```
x=c(5.1,3.2,8.5,3.5,9.2,5.5,8.3,2.7,7.7,5.9,4.5,3.3,8.9,2.5,6.1,7.4,2.7,4.8,6.9,7.8)
x
y=c(47,75,30,88,60,81,85,60,41,42,20,90,30,65,65,30,55,65,60,60)
y
model=lm(y~x)
model
summary(model)
plot(x,y,main = "Scores per hour",xlab=("Hours"),ylab=("Scores"))
abline(model,col="blue")
```

Output

```
x=c(5.1,3.2,8.5,3.5,9.2,5.5,8.3,2.7,7.7,5.9,4.5,3.3,8.9,2.5,6.1,7.4,2.7,4.8,6.9,7.8)
>
> x
 [1] 5.1 3.2 8.5 3.5 9.2 5.5 8.3 2.7 7.7 5.9 4.5 3.3 8.9 2.5 6.1 7.4 2.7 4.8 6.9 7.8
>
> y=c(47,75,30,88,60,81,85,60,41,42,20,90,30,65,65,30,55,65,60,60)
>
> y
 [1] 47 75 30 88 60 81 85 60 41 42 20 90 30 65 65 30 55 65 60 60
>
> model=lm(y~x)
>
> model

Call:
lm(formula = y ~ x)

Coefficients:
(Intercept)            x
     76.736       -3.369

>
> summary(model)

Call:
lm(formula = y ~ x)

Residuals:
   Min     1Q Median     3Q    Max
-41.58 -13.20   0.56  10.72  36.23

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   76.736     12.231   6.274 6.46e-06 ***
x             -3.369      1.993  -1.690    0.108
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 19.71 on 18 degrees of freedom
Multiple R-squared:  0.137,   Adjusted R-squared:  0.08904
F-statistic: 2.857 on 1 and 18 DF,  p-value: 0.1082

>
> plot(x,y,main = "Scores per hour",xlab=("Hours"),ylab=("Scores"))
>
> abline(model,col="blue")
```



Part (b)

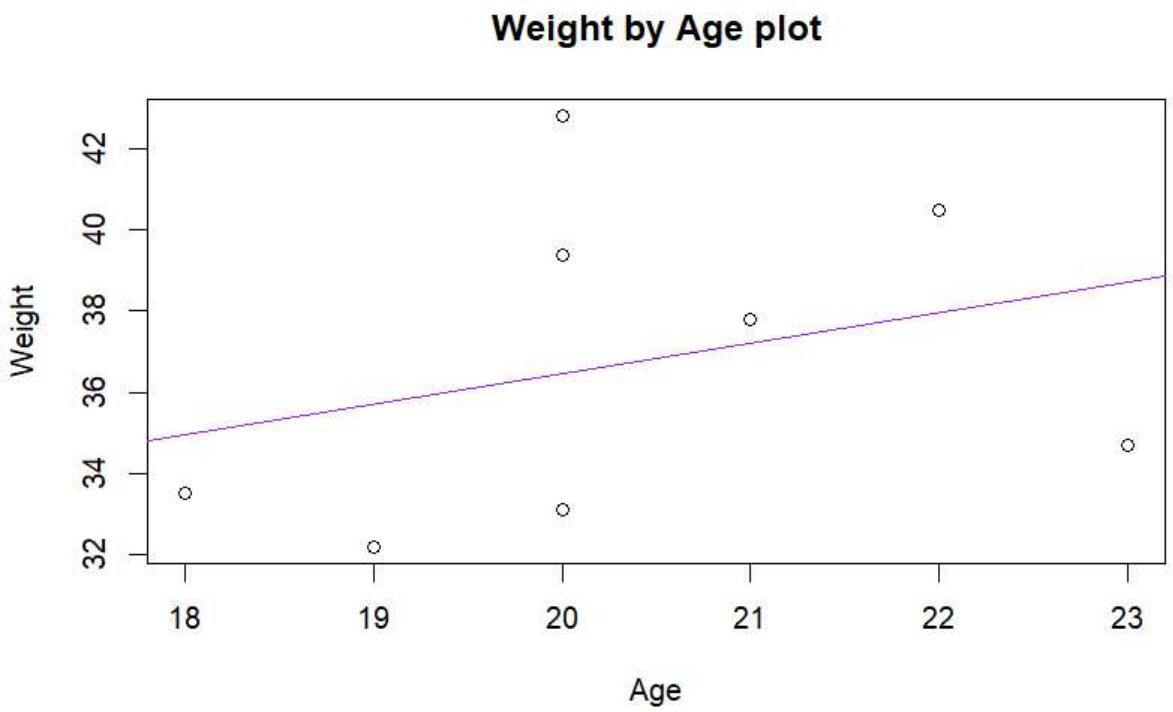
Input

```
x=c(22,20,21,20,23,18,19,20)
x
y=c(40.5,42.8,37.8,39.4,34.7,33.5,32.2,33.1)
y
model=lm(y~x)
model
summary(model)
plot(x,y,main="Weight by Age plot",xlab =("Age"),ylab=("Weight"))
abline(model,col="purple")
```

OUTPUT

```
x=c(22,20,21,20,23,18,19,20)
> x
[1] 22 20 21 20 23 18 19 20
> y=c(40.5,42.8,37.8,39.4,34.7,33.5,32.2,33.1)
> y
[1] 40.5 42.8 37.8 39.4 34.7 33.5 32.2 33.1
> model=lm(y~x)
> model

Call:
lm(formula = y ~ x)

Coefficients:
(Intercept)            x
    21.4189       0.7524

> summary(model)

Call:
lm(formula = y ~ x)

Residuals:
    Min      1Q  Median      3Q     Max
-4.0252 -3.4047 -0.4416  2.6285  6.3322

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  21.4189    19.4750   1.100    0.314
x             0.7524     0.9533   0.789    0.460

Residual standard error: 4.03 on 6 degrees of freedom
```

```
Multiple R-squared:  0.09407, Adjusted R-squared:  -0.05691
F-statistic: 0.6231 on 1 and 6 DF,  p-value: 0.46
> plot(x,y,main="Weight by Age plot",xlab =("Age"),ylab=("Weight"))
> abline(model,col="purple")
```




```
#Question no .09

Input

Temperature=c(23,32,25,35,32,35,33,27,27,29,35,33,29,25,31,34,27,38,29,38)
Temperature
Sales=c(47,75,30,88,60,81,85,60,41,42,20,90,30,65,65,30,55,65,60,60)
Sales
model=lm(Sales~Temperature)
```

```
model
summary(model)
plot(Temperature,Sales)
abline(model,col="red")
```

OutPut

```
Temperature=c(23,32,25,35,32,35,33,27,27,29,35,33,29,25,31,34,27,38,29,38)
>
> Temperature
 [1] 23 32 25 35 32 35 33 27 27 29 35 33 29 25 31 34 27 38 29 38
>
> Sales=c(47,75,30,88,60,81,85,60,41,42,20,90,30,65,65,30,55,65,60,60)
>
> Sales
 [1] 47 75 30 88 60 81 85 60 41 42 20 90 30 65 65 30 55 65 60 60
>
> model=lm(Sales~Temperature)
>
> model

Call:
lm(formula = Sales ~ Temperature)

Coefficients:
(Intercept)  Temperature
      10.87         1.51

>
> summary(model)

Call:
lm(formula = Sales ~ Temperature)
```

```
Residuals:
    Min      1Q  Median      3Q     Max
-43.716 -11.142   2.382  15.956  29.304

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept)    10.873     32.975   0.330    0.745
Temperature     1.510      1.059   1.426    0.171

Residual standard error: 20.11 on 18 degrees of freedom
Multiple R-squared:  0.1015,  Adjusted R-squared:  0.05156
F-statistic: 2.033 on 1 and 18 DF,  p-value: 0.171

> plot(Temperature,Sales)
> abline(model,col="red")
```