VIT Vidyalankar Institute of Technology

DEPARTMENT OF INFORMATION TECHNOLOGY ENGINEERING

Semester	BE Semester VIII–INFT Engineering
Subject	R Lab
Subject Professor In-charge	Prof. Shruti Agrawal
Lab Professor In-charge	Prof. Shruti Agrawal

Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	1	
Experiment Title	To understand basic datatypes and function in R	
Problem Statement	Write a R program to print Fibonacci Series of n numbers	
Resources / Apparatus Required	Hardware: Computer	Software: R studio

Code

```
{n=as.integer(readline("Enter the Number:"))
a=0
b=1
cat("Fibonacci Series is:"," ")
cat(a," ")
cat(b," ")
for(i in 3:n-1){
  c=a+b
  cat(c," ")
  a=b
  b=c
}
}
```

Output

```
Enter the Number:10
Fibonacci Series is:  0  1  1  2  3  5  8  13  21  34
```

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Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	2	
Experiment Title	To understand Recursion in R	
Problem Statement	Write a R program to find the factorial of any number n (using recursion and without using recursion as well).	
Resources / Apparatus Required	Hardware: Computer	Software: R studio

Code	a) With Recursion
	{
	fact=function(n){
	if(n <= 1){
	return(1)
	}
	return(n * fact(n-1))
	}
	n = as.integer(readline("Enter Number: "))
	f = fact(n)
	print(paste("Factorial of ", n, " is ", f))
	}	

	b) Without using Recursion
	{
	n = as.integer(readline("Enter Number: "))
	f = 1
	if(n != 0){
	for(i in 1:n){
	f = f*i
	}
	}
	print(paste("Factorial of ", n, " is ", f))
	}

Output	a) Enter Number: 5 [1] "Factorial of 5 is 120" b) Enter Number: 6 [1] "Factorial of 6 is 720"

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Lab Professor In-charge	Prof. Shruti Agrawal

Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	3	
Experiment Title	To understand conditional execution in R	
Problem Statement	Write a R program to check if the given number is Armstrong or not.	
Resources / Apparatus Required	Hardware: Computer	Software: R studio

Code

```
{
armstrong = function(n){
 temp = n
 a = 0
 while(temp > 0){
  r = temp %% 10
  a = a + (r^3)
  temp = floor(temp/10)
 }
 if(n == a){
  return(TRUE)
 }
 else {
  return(FALSE)
 }
```

	}
	
	n = as.integer(readline("Enter Number: "))
	a = armstrong(n)
	print(paste(a))
	if(a){
	  print(paste("", n, " is an Armstrong Number!"))
	}else {
	  print(paste("", n, " is NOT an Armstrong Number!"))
	}
	}

Output	Enter Number: 153 [1] "TRUE" [1] " 153 is an Armstrong Number!" >

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DEPARTMENT OF INFORMATION TECHNOLOGY ENGINEERING

Semester	BE Semester VIII–INFT Engineering
Subject	R Lab
Subject Professor In-charge	Prof. Shruti Agrawal
Lab Professor In-charge	Prof. Shruti Agrawal

Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	4	
Experiment Title	To understand conditional execution in R	
Problem Statement	Write a menu driven R program to demonstrate a calculator.	
Resources / Apparatus Required	Hardware: Computer	Software: R studio

Code	{
	add = function(x, y) {
	  return(x + y)
	}
	subtract = function(x, y) {
	  return(x - y)
	}
	multiply = function(x, y) {
	  return(x * y)
	}
	divide = function(x, y) {
	  return(x / y)
	}
	
	print("Select operation.")	

	print("1.Add") print("2.Subtract") print("3.Multiply") print("4.Divide") choice = as.integer(readline("Enter choice[1/2/3/4]: ")) num1 = as.integer(readline("Enter first number: ")) num2 = as.integer(readline("Enter second number: ")) operator = switch(choice,"+","-","*","/") result = switch(choice, add(num1, num2), subtract(num1, num2), multiply(num1, num2), divide(num1, num2)) print(paste(num1, operator, num2, "=", result)) }
Output	[1] "Select operation." [1] "1.Add" [1] "2.Subtract" [1] "3.Multiply" [1] "4.Divide" Enter choice[1/2/3/4]: 3 Enter first number: 10 Enter second number: 20 [1] "10 * 20 = 200"

VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	**Department of Information Technology**

Semester	B.E. Semester VIII – INFT
Subject	R lab
Laboratory Teacher:	Prof. Shruti Agrawal
Laboratory	-

Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	5	
Experiment Title	To understand Matrix in R	
Problem Statement	Write a R program to accept matrix element from user.	
Resources / Apparatus Required	Hardware: Desktop/Laptop	Software: R Studio

Code:	{
	 r = as.integer(readline("Enter the no. of rows: "))
	 c = as.integer(readline("Enter the no. of columnns: "))
	 val = c()
	 total=r*c-1
	 for (i in 0:total) {
	 n = as.integer(readline("Enter the element:"))
	 val = c(val, n)
	 }
	
	 Mtrx = matrix(val,nrow=r,ncol=c,byrow = TRUE)	

	cat("Matrix is:\n") print(Mtrx) }
Output:	Enter the no. of rows: 3 Enter the no. of columnns: 3 Enter the element:1 Enter the element:2 Enter the element:3 Enter the element:4 Enter the element:5 Enter the element:6 Enter the element:7 Enter the element:8 Enter the element:9 Matrix is: [,1] [,2] [,3] [1,] 1 2 3 [2,] 4 5 6 [3,] 7 8 9

VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	**Department of Information Technology**

Semester	B.E. Semester VIII – INFT
Subject	R lab
Laboratory Teacher:	Prof. Shruti Agrawal
Laboratory	-

Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	6	
Experiment Title	To understand Matrix in R	
Problem Statement	Write a menu driven R program on matrix operations.	
Resources / Apparatus Required	Hardware: Desktop/Laptop	Software: R Studio
Code:	{	

```
  Addition = function(M1,M2,n){

    val = c()

    for (i in 1:n){
      for(j in 1:n){
        val = c(val, M1[i,j]+M2[i,j])
      }
    }
```

```
  M3 = matrix(val,nrow=n,ncol=n,byrow = TRUE)

  return(M3)

}

Subtraction = function(M1,M2,n){

  val = c()

  for (i in 1:n){
    for(j in 1:n){
      val = c(val, M1[i,j]-M2[i,j])
    }
  }

  M3 = matrix(val,nrow=n,ncol=n,byrow = TRUE)

  return(M3)

}

Multiplication = function(M1,M2,n){

  val = c()

  for (i in 1:n){
    for(j in 1:n){
      s=0
      for(k in 1:n){


        s=s+(M1[i,k]*M2[k,j])
      }
      val = c(val, s)
    }
  }

  M3 = matrix(val,nrow=n,ncol=n,byrow = TRUE)

  return(M3)

}
```

```
  cat("\n
======================MENU================
========== \n")
  cat("\n Matrix Operations \n")
  cat("\n 1 : Addition \n")
  cat("\n 2 : Subtraction \n")
  cat("\n 3 : Multiplication \n")
  cat("\n")

  choice = as.integer(readline("Enter the choice: "))

  n = as.integer(readline("Enter the order of matrices: "))
  val = c()
  total=n*n-1
  print("Enter the elements for Matrix 1")
  for (i in 0:total) {
    ele = as.integer(readline("Enter the element:"))
    val = c(val, ele)
  }

  Mtrx1 = matrix(val,nrow=n,ncol=n,byrow = TRUE)

  val = c()
  total=n*n-1
  cat("\n")
  print("Enter the elements for Matrix 2")
  for (i in 0:total) {
    ele = as.integer(readline("Enter the element:"))
    val = c(val, ele)
  }

  Mtrx2 = matrix(val,nrow=n,ncol=n,byrow = TRUE)

  cat("\n Matrix 1 is: \n")
  print(Mtrx1)

  cat("\n Matrix 2 is: \n")
  print(Mtrx2)


  operation =
switch(choice,"Addition","Subtraction","Multiplication")
```

	result = switch(choice, Addition(Mtrx1,Mtrx2,n), Subtraction(Mtrx1,Mtrx2,n), Multiplication(Mtrx1,Mtrx2,n)) cat("\n") print(paste(operation,"of Matrices", "are:")) print(result) }
Output:	======================MENU========================== Matrix Operations 1 : Addition 2 : Subtraction 3 : Multiplication Enter the choice: 3 Enter the order of matrices: 2 [1] "Enter the elements for Matrix 1" Enter the element:1 Enter the element:2 Enter the element:3 Enter the element:4 [1] "Enter the elements for Matrix 2" Enter the element:5 Enter the element:6 Enter the element:7 Enter the element:8 Matrix 1 is: [,1] [,2] [1,] 1 2 [2,] 3 4 Matrix 2 is: [,1] [,2] [1,] 5 6 [2,] 7 8 [1] "Multiplication of Matrices are:" [,1] [,2] [1,] 19 22 [2,] 43 50

VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	**Department of Information Technology**

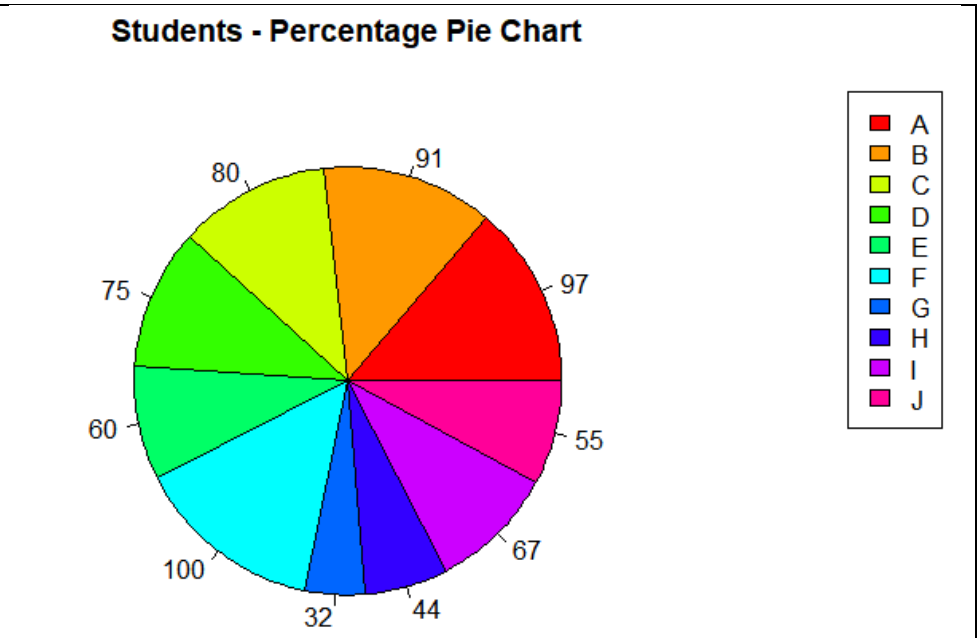
Semester	B.E. Semester VIII – INFT
Subject	R lab
Laboratory Teacher:	Prof. Shruti Agrawal
Laboratory	-

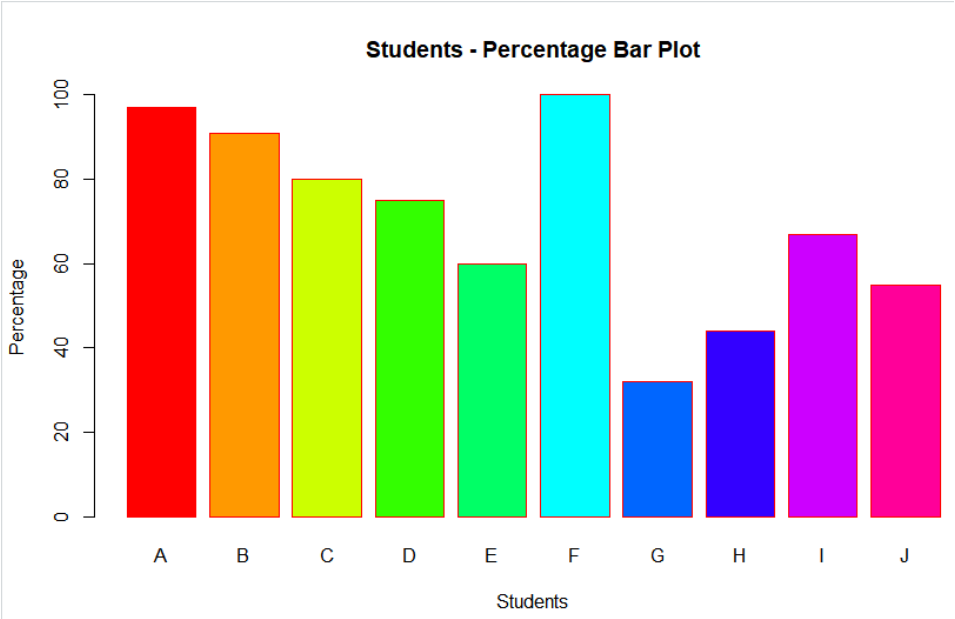
Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

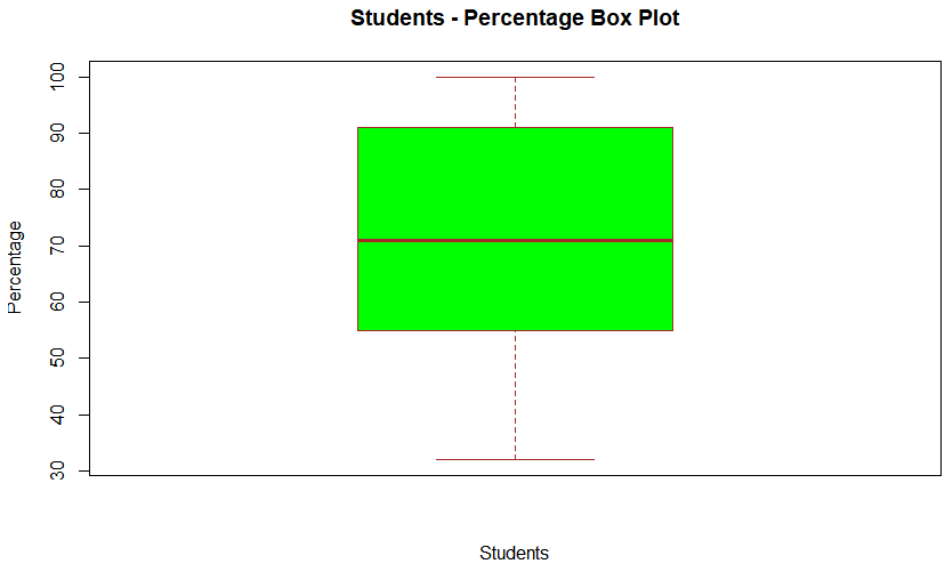
Experiment Number	7	
Experiment Title	To understand Plots in R	
Problem Statement	Write a R program to two vectors containing 10 students name and there percentage marks. Plot Piechart, Barplot, Boxplot, Histogram, Line Graph, Scatter Plot.	
Resources / Apparatus Required	Hardware: Desktop/Laptop	Software: R Studio
Code:	{ student = c("A","B","C","D","E","F","G","H","I","J") per= c(97,91,80,75,60,100,32,44,67,55) pie(per, labels = per, main = "Students - Percentage Pie Chart",col = rainbow(length(per))) legend("topright", student, fill = rainbow(length(per)))	

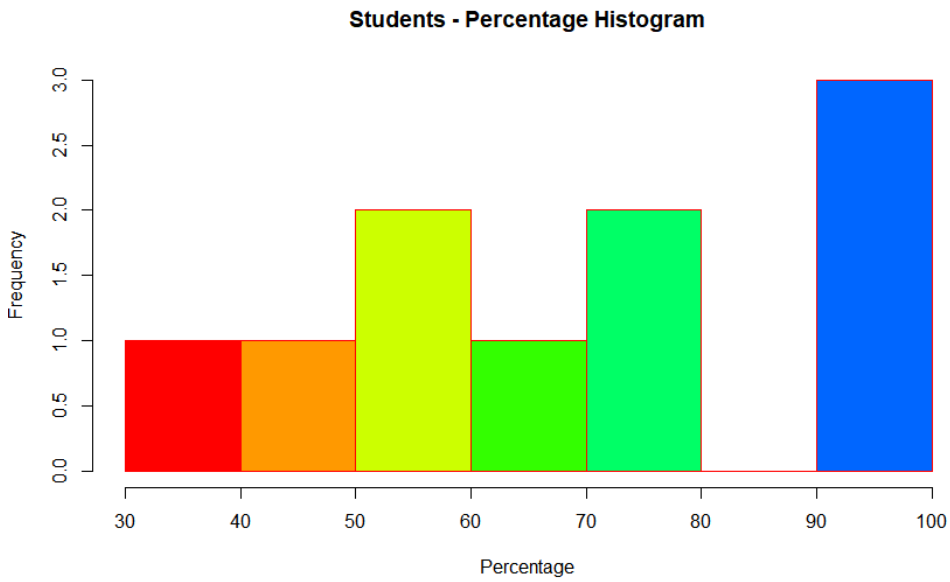
```
barplot(per,names.arg=student,xlab="Students",ylab="Percentage"
,col=rainbow(length(per)),
        main="Students - Percentage Bar Plot",border="red")

  boxplot(per,
        xlab = "Students",
        ylab = "Percentage",
        main = "Students - Percentage Box Plot",
        col = c("green"),
        border = "brown",
        names = c("High")
  )

  hist(per,xlab = "Percentage",col = rainbow(length(per)),border =
"red",xlim = c(30,100), ylim = c(0,3),
      main = "Students - Percentage Histogram")

  plot(per,type = "o", col="red", xlab = "Students", ylab =
"Percentage",
      main = "Student - Percentage line chart")

  plot(per,xlab = "Students",
      ylab = "Percentage",
      ylim = c(30,100),
      main = "Student - Percentage Scatter Plot",
      col = c("red"),
      )
}
```

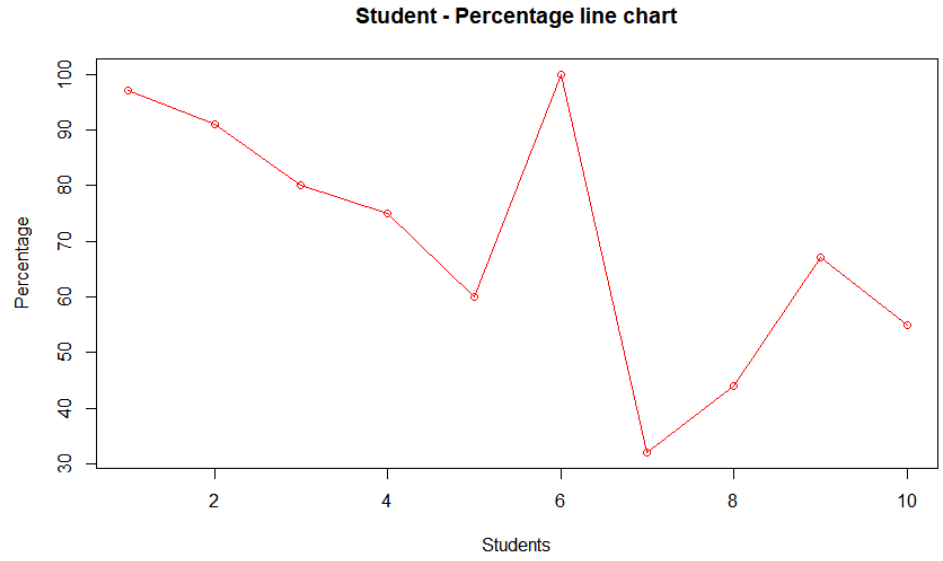
Output:

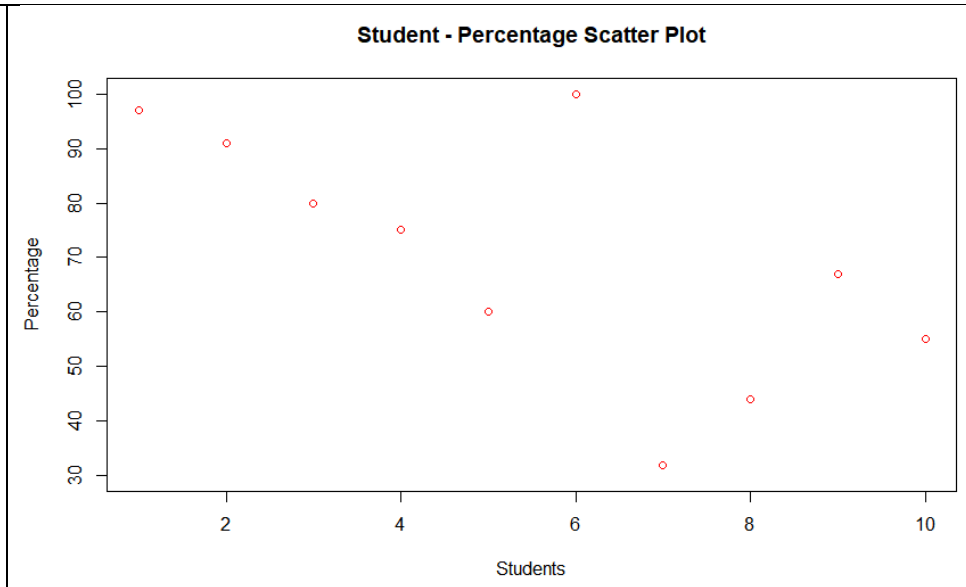

Students - Percentage Pie Chart
A
B
C
D
E
F
G
H
I
J
91
97
55
67
44
32
100
60
75
80


Students - Percentage Bar Plot
Percentage
0
20
40
60
80
100
A
B
C
D
E
F
G
H
I
J
Students


Students - Percentage Box Plot
Percentage
30
40
50
60
70
80
90
100
Students


Students - Percentage Histogram
Frequency
0.0
0.5
1.0
1.5
2.0
2.5
3.0
30
40
50
60
70
80
90
100
Percentage


Student - Percentage line chart
Percentage
30
40
50
60
70
80
90
100
2
4
6
8
10
Students


Student - Percentage Scatter Plot
Percentage
30
40
50
60
70
80
90
100
2
4
6
8
10
Students

Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	**Department of Information Technology**

Semester	B.E. Semester VIII – INFT
Subject	R lab
Laboratory Teacher:	Prof. Shruti Agrawal
Laboratory	-

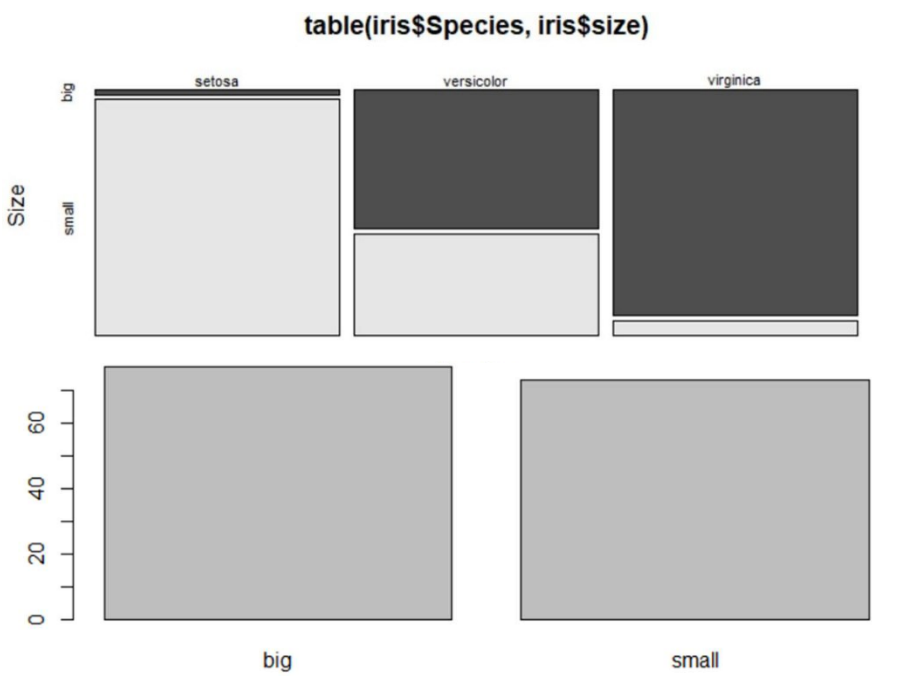
Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

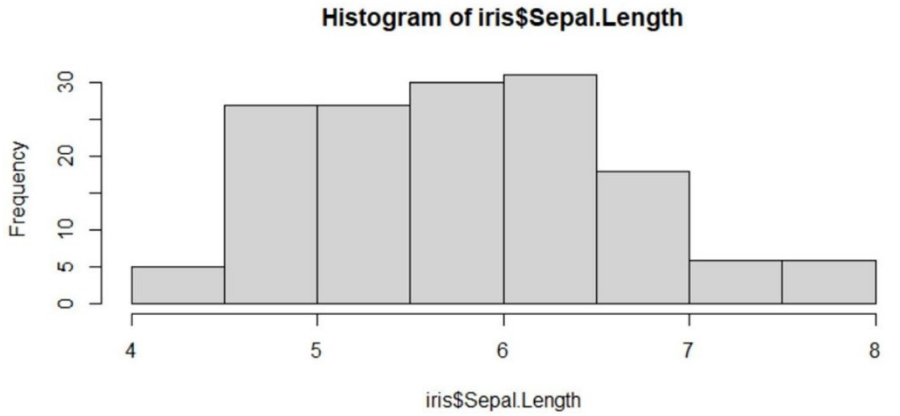
Experiment Number	8	
Experiment Title	To understand exploratory data analysis in R	
Problem Statement	Write a R program to import a data set of minimum 100 tuples and perform exploratory data analysis in it. Provide proper screenshot to every function.	
Resources / Apparatus Required	Hardware: Desktop/Laptop	Software: R Studio

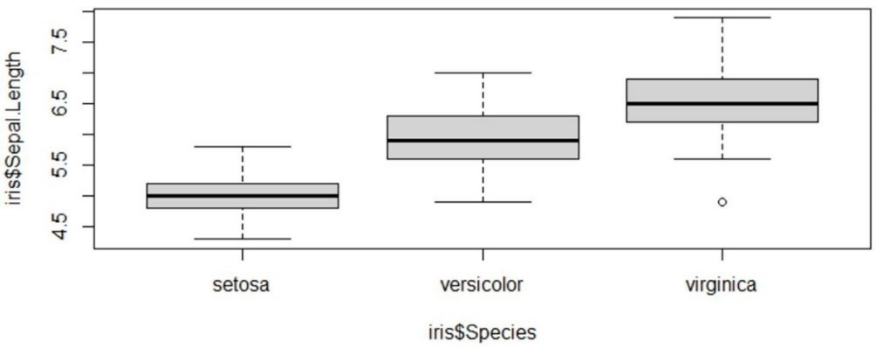
Code and Output

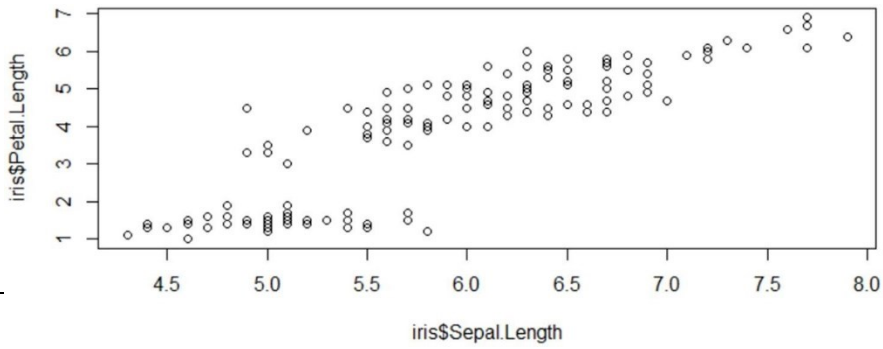
```
> data(iris)
> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
5          5.0         3.6          1.4         0.2  setosa
6          5.4         3.9          1.7         0.4  setosa
> dim(iris)
[1] 150   5
> min(iris$Petal.Length)
[1] 1
> range(iris$Petal.Length)
[1] 1.0 6.9
> max(iris$Sepal.Length) - min(iris$Sepal.Length)
[1] 3.6
> mean(iris$Petal.Length)
[1] 3.758
> median(iris$Sepal.Width)
[1] 3
> quantile(iris$Sepal.Length, 0.75)
75%
6.4
> quantile(iris$Petal.Length, 0.95)
95%
6.1
> IQR(iris$Sepal.Length)
[1] 1.3
> sd(iris$Sepal.Width)
[1] 0.4358663
> var(iris$Petal.Length)
[1] 3.116278
> summary(iris)
  Sepal.Length    Sepal.Width     Petal.Length    Petal.Width          Species
 Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100   setosa    :50
 1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300   versicolor:50
 Median :5.800   Median :3.000   Median :4.350   Median :1.300   virginica :50
 Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
 3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
 Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
```

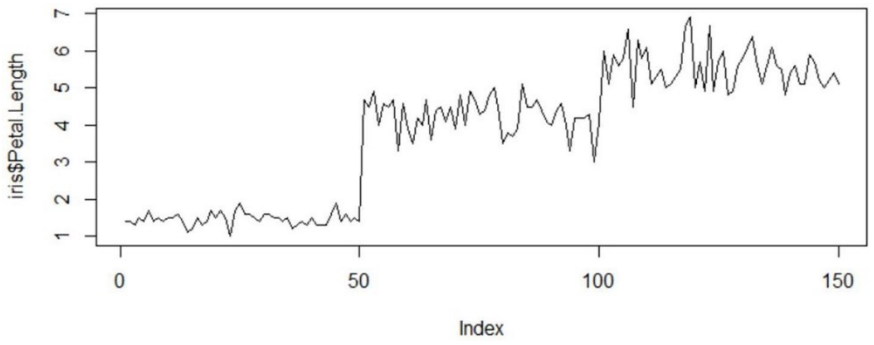
```
> by(iris, iris$Species, summary)
iris$Species: setosa
  Sepal.Length    Sepal.Width     Petal.Length    Petal.Width          Species
 Min.   :4.300   Min.   :2.300   Min.   :1.000   Min.   :0.100   setosa    :50
 1st Qu.:4.800   1st Qu.:3.200   1st Qu.:1.400   1st Qu.:0.200   versicolor: 0
 Median :5.000   Median :3.400   Median :1.500   Median :0.200   virginica : 0
 Mean   :5.006   Mean   :3.428   Mean   :1.462   Mean   :0.246
 3rd Qu.:5.200   3rd Qu.:3.675   3rd Qu.:1.575   3rd Qu.:0.300
 Max.   :5.800   Max.   :4.400   Max.   :1.900   Max.   :0.600
------------------------------------------------------------
iris$Species: versicolor
  Sepal.Length    Sepal.Width     Petal.Length   Petal.Width          Species
 Min.   :4.900   Min.   :2.000   Min.   :3.00   Min.   :1.000   setosa    : 0
 1st Qu.:5.600   1st Qu.:2.525   1st Qu.:4.00   1st Qu.:1.200   versicolor:50
 Median :5.900   Median :2.800   Median :4.35   Median :1.300   virginica : 0
 Mean   :5.936   Mean   :2.770   Mean   :4.26   Mean   :1.326
 3rd Qu.:6.300   3rd Qu.:3.000   3rd Qu.:4.60   3rd Qu.:1.500
 Max.   :7.000   Max.   :3.400   Max.   :5.10   Max.   :1.800
------------------------------------------------------------
iris$Species: virginica
  Sepal.Length    Sepal.Width     Petal.Length    Petal.Width          Species
 Min.   :4.900   Min.   :2.200   Min.   :4.500   Min.   :1.400   setosa    : 0
 1st Qu.:6.225   1st Qu.:2.800   1st Qu.:5.100   1st Qu.:1.800   versicolor: 0
 Median :6.500   Median :3.000   Median :5.550   Median :2.000   virginica :50
 Mean   :6.588   Mean   :2.974   Mean   :5.552   Mean   :2.026
 3rd Qu.:6.900   3rd Qu.:3.175   3rd Qu.:5.875   3rd Qu.:2.300
 Max.   :7.900   Max.   :3.800   Max.   :6.900   Max.   :2.500
> tab <- table(iris$Sepal.Length)
> sort(tab, decreasing = TRUE)

  5 5.1 6.3 5.7 6.7 5.5 5.8 6.4 4.9 5.4 5.6   6 6.1 4.8 6.5 4.6 5.2 6.2 6.9 7.7 4.4 5.9
 10   9   9   8   8   7   7   7   6   6   6   6   6   5   5   4   4   4   4   4   3   3
6.8 7.2 4.7 6.6 4.3 4.5 5.3   7 7.1 7.3 7.4 7.6 7.9
  3   3   2   2   1   1   1   1   1   1   1   1   1
```

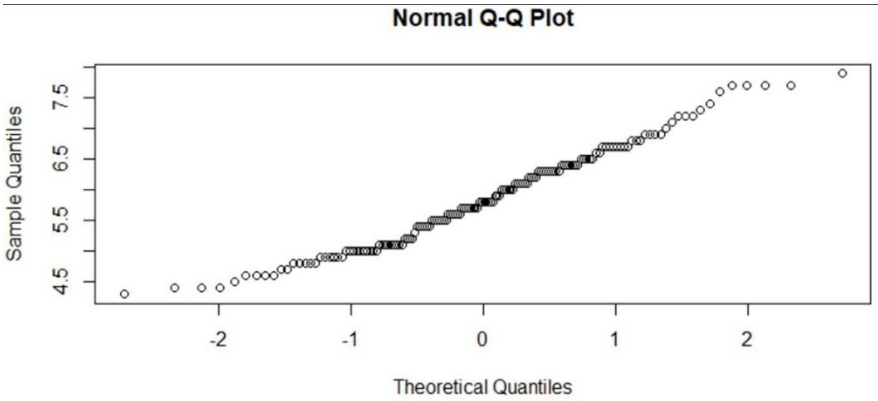

table(iris$Species, iris$size)
setosa
versicolor
virginica
big
small
Size
0
20
40
60
big
small

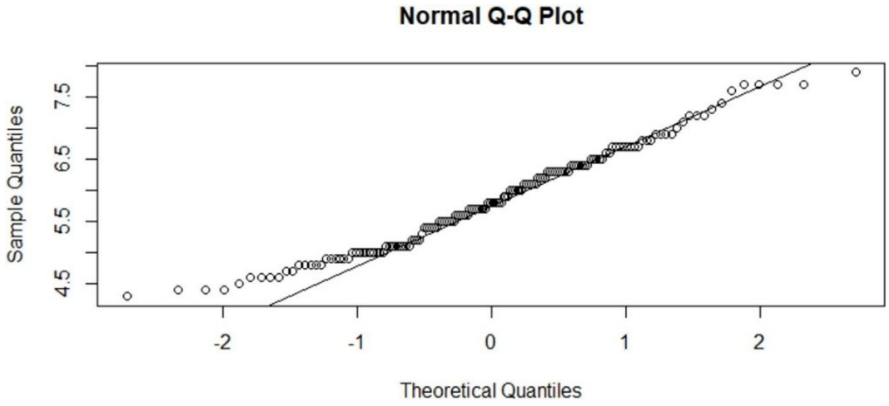

Histogram of iris$Sepal.Length
Frequency
0
5
10
20
30
4
5
6
7
8
iris$Sepal.Length

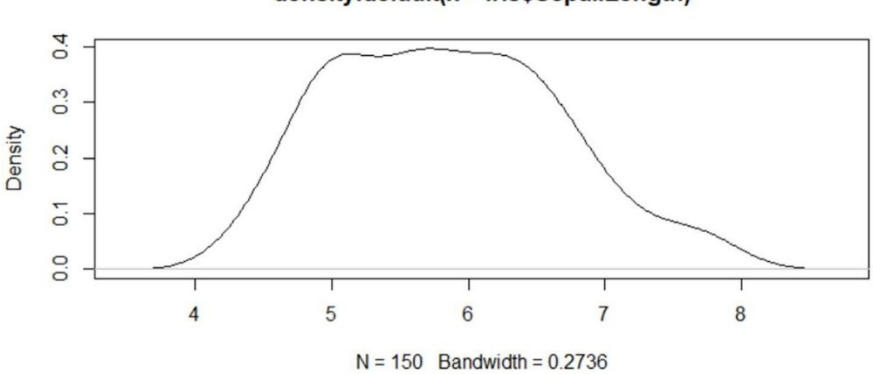

iris$Sepal.Length
4.5
5.5
6.5
7.5
setosa
versicolor
virginica
iris$Species


iris$Petal.Length
1
2
3
4
5
6
7
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
iris$Sepal.Length


iris$Petal.Length
1
2
3
4
5
6
7
0
50
100
150
Index


Normal Q-Q Plot
Sample Quantiles
4.5
5.5
6.5
7.5
-2
-1
0
1
2
Theoretical Quantiles


Normal Q-Q Plot
Sample Quantiles
4.5
5.5
6.5
7.5
-2
-1
0
1
2
Theoretical Quantiles


density.default(x = iris$Sepal.Length)
Density
0.0
0.1
0.2
0.3
0.4
4
5
6
7
8
N = 150 Bandwidth = 0.2736

```
> library(summarytools)
> freq(iris$Species)
Frequencies
iris$Species
Type: Factor

                  Freq   % Valid   % Valid Cum.   % Total   % Total Cum.
---------------- ------ --------- -------------- --------- --------------
          setosa     50     33.33          33.33     33.33          33.33
      versicolor     50     33.33          66.67     33.33          66.67
       virginica     50     33.33         100.00     33.33         100.00
            <NA>      0                               0.00         100.00
           Total    150    100.00         100.00    100.00         100.00
>
> freq(iris$Species,report.nas = FALSE,totals = FALSE,cumul = FALSE,headings = FALSE)

                  Freq       %
---------------- ------ -------
          setosa     50   33.33
      versicolor     50   33.33
       virginica     50   33.33
>
> ctable(
+   x = iris$Species,y = iris$size)
Cross-Tabulation, Row Proportions
Species * size
Data Frame: iris

------------ ------ ------------ ------------ --------------
              size          big        small          Total
     Species
      setosa            1 ( 2.0%)   49 (98.0%)    50 (100.0%)
  versicolor           29 (58.0%)   21 (42.0%)    50 (100.0%)
   virginica           47 (94.0%)    3 ( 6.0%)    50 (100.0%)
       Total           77 (51.3%)   73 (48.7%)   150 (100.0%)
------------ ------ ------------ ------------ --------------
>
> aggregate(cbind(Sepal.Length, Sepal.Width) ~ Species + size,data = iris,mean)
     Species  size Sepal.Length Sepal.Width
1     setosa   big     5.800000    4.000000
2 versicolor   big     6.282759    2.868966
3  virginica   big     6.663830    2.997872
4     setosa small     4.989796    3.416327
5 versicolor small     5.457143    2.633333
6  virginica small     5.400000    2.600000
```

VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	**Department of Information Technology**

Semester	B.E. Semester VIII – INFT
Subject	R Programming
Laboratory Teacher:	Prof. Shruti Agrawal
Laboratory	-

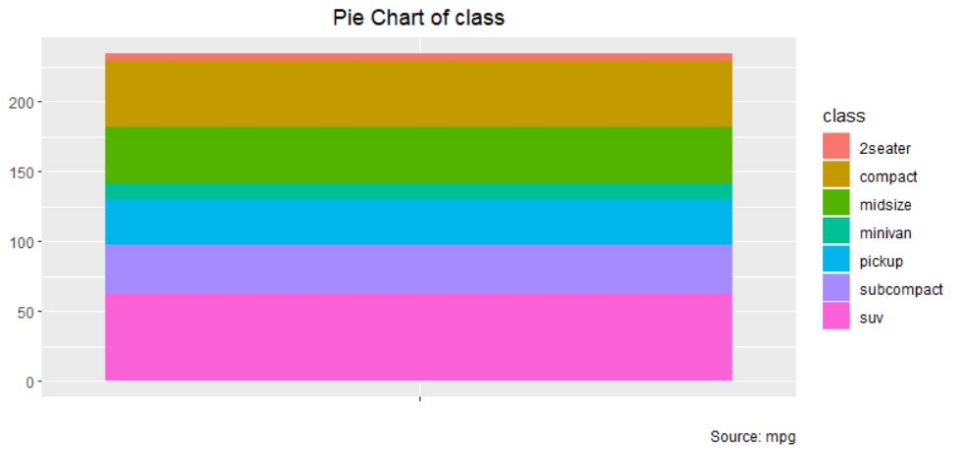
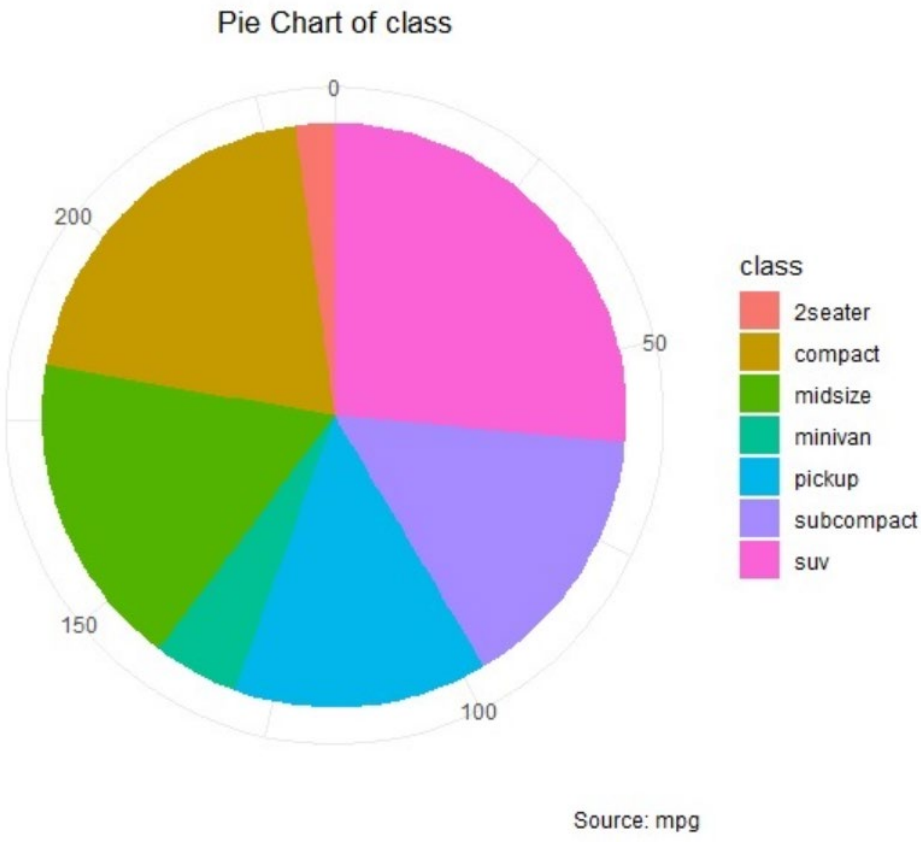
Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	9	
Experiment Title	To understand ggplot2 graphics	
Problem Statement	Write a R program to import a data set of minimum 100 tuples and Plot Pie chart, Bar plot, Boxplot, Histogram, Line Graph, Scatter Plot, Frequency Polygon using ggplot2(using all elements and attributes of aesthetics).	
Resources / Apparatus Required	Hardware: Desktop/Laptop	Software: R and R Studio

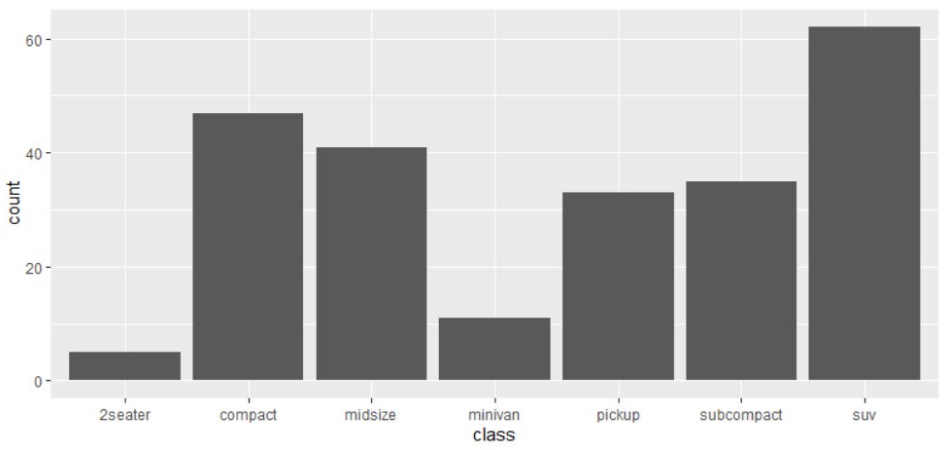
Code:	library(ggplot2)
	data(iris)
	
	# Pie Chart
	df <- as.data.frame(table(mpg$class))
	colnames(df) <- c("class", "freq")	

```
pie <- ggplot(df, aes(x = "", y=freq, fill =
factor(class)))+geom_bar(width = 1, stat =
"identity")+theme(axis.line = element_blank(), plot.title =
element_text(hjust=0.5)) +labs(fill="class", x=NULL, y=NULL,
title="Pie Chart of class", caption="Source: mpg")
pie + coord_polar(theta = "y")
pie

#Bar Plot
p <- ggplot(mpg, aes(class))
p + geom_bar()

# Box Plot
p <- ggplot(ToothGrowth, aes(x=dose, y=len)) +
  geom_boxplot()
p
# Rotate the box plot
p + coord_flip()
# Notched box plot
ggplot(ToothGrowth, aes(x=dose, y=len)) +
  geom_boxplot(notch=TRUE)

# Histogram
ggplot(data=mpg, aes(x=hwy))+geom_histogram(col="red",
fill="green", alpha = .2, binwidth = 5)

#Line graph
df <- data.frame(dose=c("D0.5", "D1", "D2"),
                 len=c(4.2, 10, 29.5))
head(df)
ggplot(data=df, aes(x=dose, y=len, group=1))
+geom_line(color="red")+geom_point()


# Scatter Plot
ggplot(iris, aes(Sepal.Length, Petal.Length,
colour=Species))+geom_point(shape=1)+geom_smooth(method=l
m)



#Frequency Polygon
# ID
ID <- 1:200
```

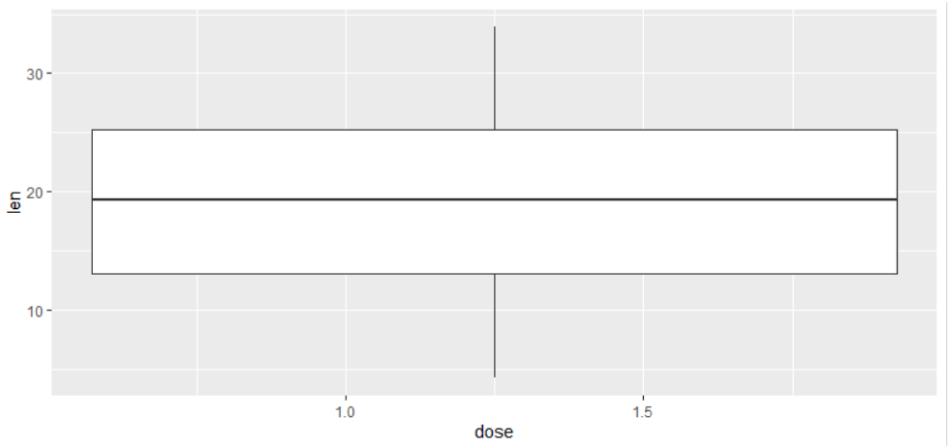
	# sample data
	values <- rnorm(200, mean=65, sd=15)
	# dataframe
	df <- data.frame(ID, values)
	ggplot(df, aes(values)) +
	  geom_freqpoly()

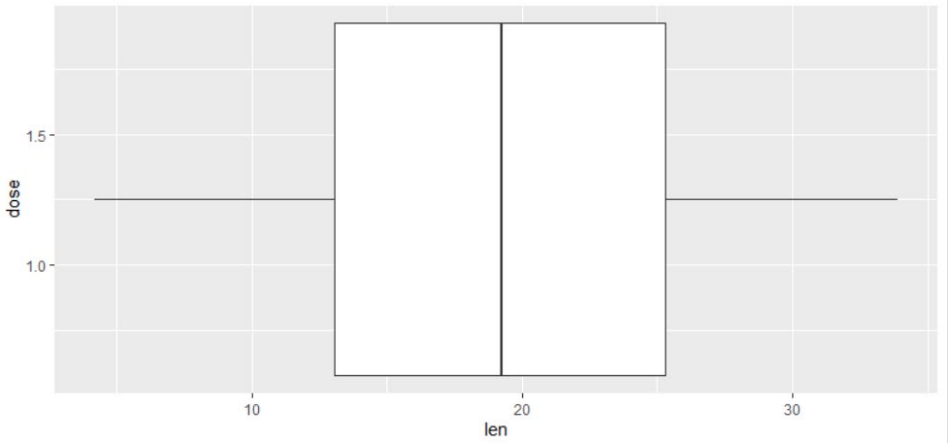
Output:	Pie Chart  

Bar Plot

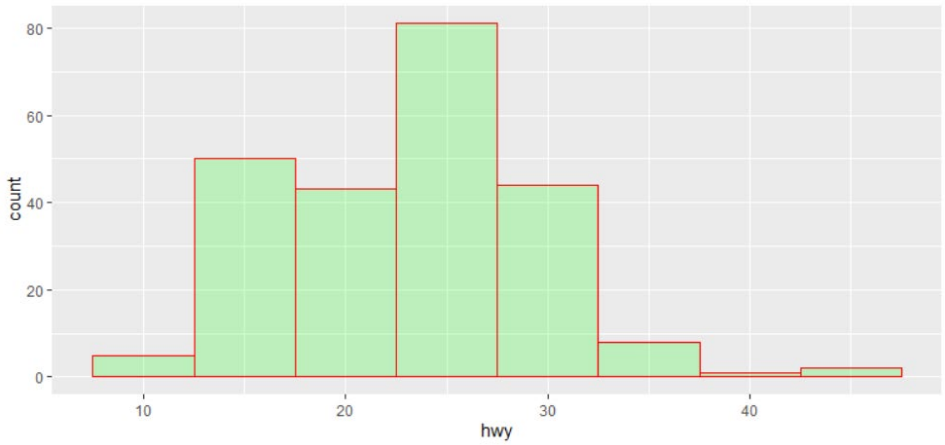


Box Plot

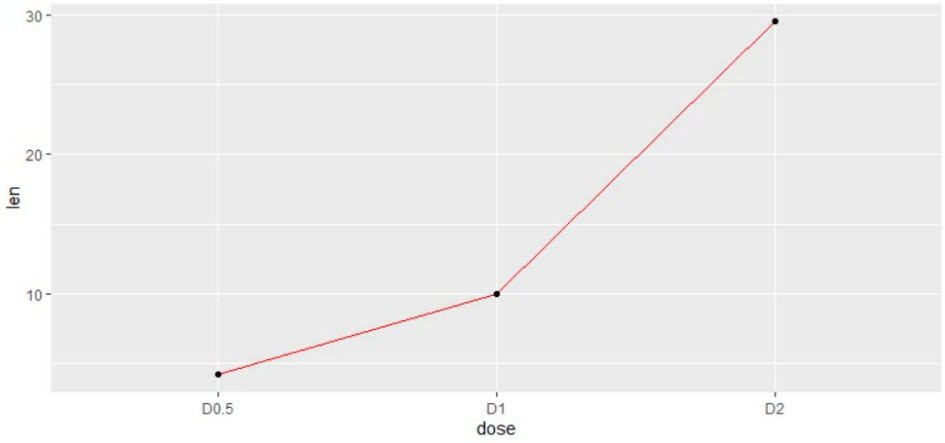




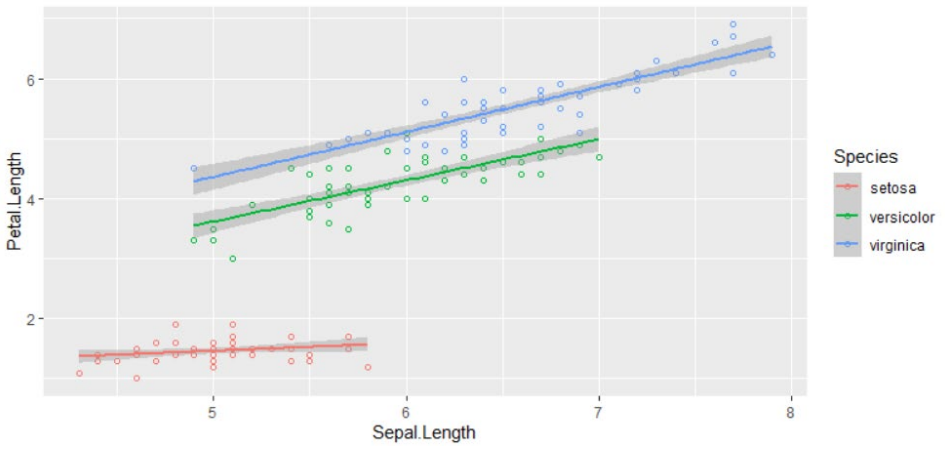
Histogram

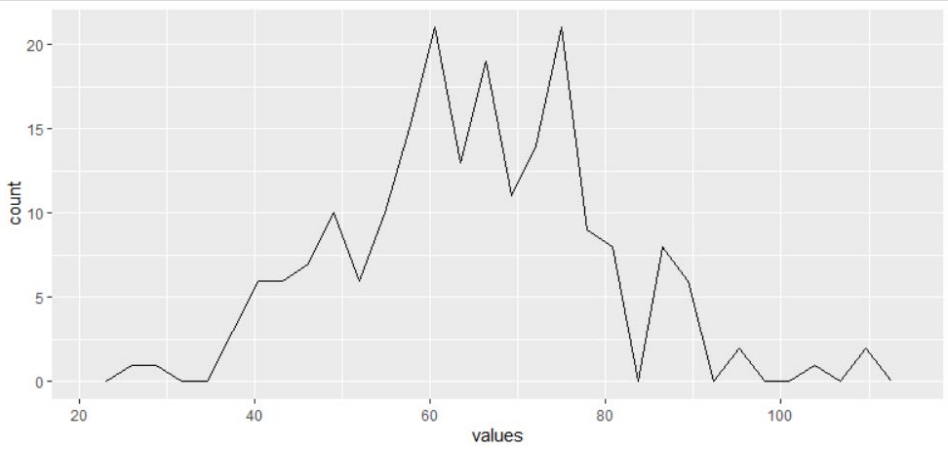


Line Graph



Scatter Plot



	Frequency Polygon 

VIT Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	**Department of Information Technology**

Semester	B.E. Semester VIII – INFT
Subject	R Programming
Laboratory Teacher:	Prof. Shruti Agrawal
Laboratory	-

Student Name	Prashik Nikumbe	
Roll Number	18101A0040	
Grade and Subject Teacher's Signature		

Experiment Number	10	
Experiment Title	To understand Regression and correlation	
Problem Statement	Write a R program to import a dataset and print the results of summary and plots of simple regression, multiple regression and correlation.	
Resources / Apparatus Required	Hardware: Desktop/Laptop	Software: R and R Studio
Code:	data(mtcars) head(mtcars) input<-mtcars input$am <- as.factor(input$am) levels(input$am) <-c("AT", "MT") fit<-lm(mpg~am,data=input) summary(fit) m3 <- lm(mpg ~ hp + am + wt, data = mtcars)	

	summary(m3) d<-mtcars[c(-11,-10, -9, -8)] d cr<-cor(d) library(corrplot) corrplot(cr,method="pie")

Output:	`> data(mtcars)`
	`> head(mtcars)`
	`                   mpg cyl disp  hp drat    wt  qsec vs am gear carb`
	`Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4`
	`Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4`
	`Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1`
	`Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1`
	`Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2`
	`Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1`
	`> input<-mtcars`
	`> input$am <- as.factor(input$am)`
	`> levels(input$am) <-c("AT", "MT")`
	`> fit<-lm(mpg~am,data=input)`
	`> summary(fit)`
	
	`Call:`
	`lm(formula = mpg ~ am, data = input)`
	
	`Residuals:`
	`    Min      1Q  Median      3Q     Max`
	`-9.3923 -3.0923 -0.2974  3.2439  9.5077`
	
	`Coefficients:`
	`            Estimate Std. Error t value Pr(>|t|)`
	`(Intercept)   17.147      1.125  15.247 1.13e-15 ***`
	`amMT           7.245      1.764   4.106 0.000285 ***`
	`---`
	`Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1`
	
	`Residual standard error: 4.902 on 30 degrees of freedom`
	`Multiple R-squared:  0.3598,    Adjusted R-squared:  0.3385`
	`F-statistic: 16.86 on 1 and 30 DF,  p-value: 0.000285`

```
> m3 <- lm(mpg ~ hp + am + wt, data = mtcars)
> summary(m3)

Call:
lm(formula = mpg ~ hp + am + wt, data = mtcars)

Residuals:
    Min      1Q  Median      3Q     Max
-3.4221 -1.7924 -0.3788  1.2249  5.5317

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 34.002875   2.642659  12.867 2.82e-13 ***
hp          -0.037479   0.009605  -3.902 0.000546 ***
am           2.083710   1.376420   1.514 0.141268
wt          -2.878575   0.904971  -3.181 0.003574 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.538 on 28 degrees of freedom
Multiple R-squared:  0.8399,    Adjusted R-squared:  0.8227
F-statistic: 48.96 on 3 and 28 DF,  p-value: 2.908e-11
```