DATE:-11 FEB 2023 **VAMSI MANUBOTHU-192011429**

DAY 4 LAB ASSIGNMENT

ITA0443-STATISTICS WITH R PROGRAMMING

GITHUB LINK:- https://github.com/Vamsim29/ITA0443-STATISTICS-WITH-R-PROGRAMMING

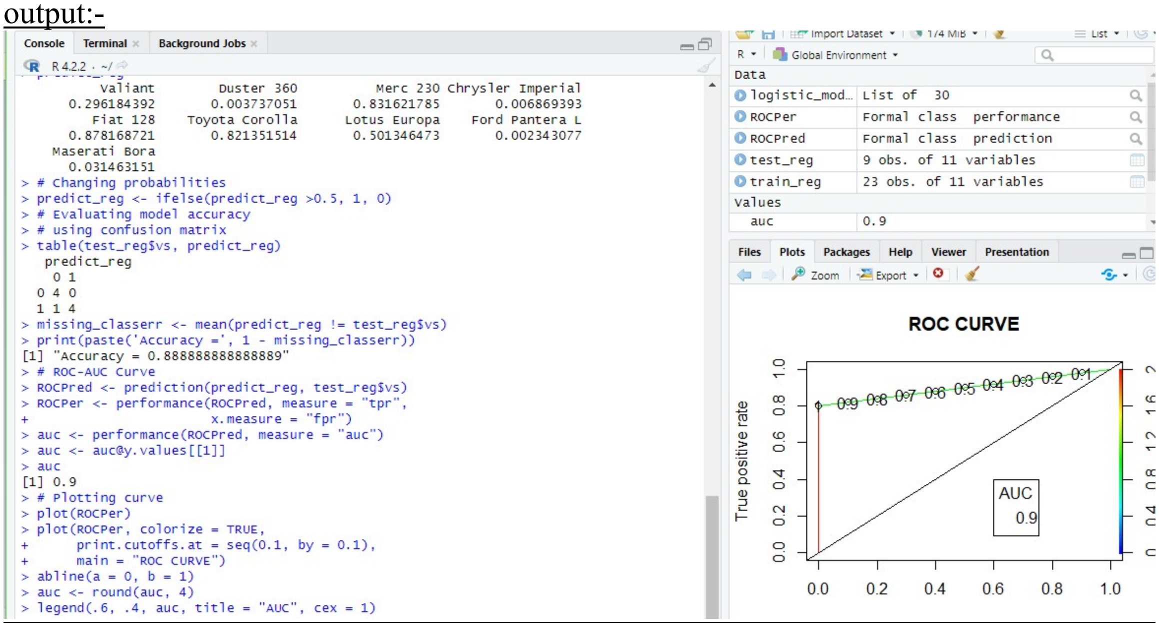
1.Randomly Sample the iris dataset such as 80% data for training and 20% for test and create Logistics regression with train data, use species as target and petals width and length as feature variables , Predict the probability of the model using test data, Create Confusion matrix for above test model

program:-

```
library(caTools)
library(ROCR)
split <- sample.split(mtcars, SplitRatio = 0.8)
split

train_reg <- subset(mtcars, split == "TRUE")
test_reg <- subset(mtcars, split == "FALSE")

logistic_model <- glm(vs ~ wt + disp,
             data = train_reg,
             family = "binomial")
logistic_model
summary(logistic_model)


predict_reg <- predict(logistic_model,
              test_reg, type = "response")
predict_reg

predict_reg <- ifelse(predict_reg >0.5, 1, 0)

table(test_reg$vs, predict_reg)

missing_classerr <- mean(predict_reg != test_reg$vs)
print(paste('Accuracy =', 1 - missing_classerr))

ROCPred <- prediction(predict_reg, test_reg$vs)
ROCPer <- performance(ROCPred, measure = "tpr",
             x.measure = "fpr")
```

```
auc <- performance(ROCPred, measure = "auc")
auc <- auc@y.values[[1]]
auc

plot(ROCPer)
plot(ROCPer, colorize = TRUE,
    print.cutoffs.at = seq(0.1, by = 0.1),
    main = "ROC CURVE")
abline(a = 0, b = 1)

auc <- round(auc, 4)
legend(.6, .4, auc, title = "AUC", cex = 1)
```

output:-



2. (i)Write suitable R code to compute the mean, median ,mode of the following values
c(90, 50, 70, 80, 70, 60, 20, 30, 80, 90, 20)
(ii) Write R code to find 2nd highest and 3rd Lowest value of above problem.

```
a = c(90, 50, 70, 80, 70, 60, 20, 30, 80, 90, 20)
> print(mean(a))
[1] 60
> print(median(a))
[1] 70
> getmode <- function(v) {
+     uniqv <- unique(v)
+     uniqv[which.max(tabulate(match(v, uniqv)))]
+ }
> print(getmode(a))
[1] 90
```

```
> print(max(a))
[1] 90
> x = sort(a)

> print(x[10])
[1] 90
> print(x[9])
[1] 80
```

3. Explore the airquality dataset. It contains daily air quality measurements from New York during a period of five months:
• Ozone: mean ozone concentration (ppb), • Solar.R: solar radiation (Langley),
• Wind: average wind speed (mph), • Temp: maximum daily temperature in degrees Fahrenheit,
• Month: numeric month (May=5, June=6, and so on),• Day: numeric day of the month (1 -4).
i. Compute the mean temperature(don't use build in function)
ii.Extract the first five rows from airquality.
iii.Extract all columns from airquality except Temp and Wind
iv.Which was the coldest day during the period?
v.How many days was the wind speed greater than 17 mph?

```
x = airquality
> mymedian <- function(lst) {
+    n <- length(lst)
+    s <- sort(lst)
+    ifelse(n%%2==1,s[(n+1)/2],mean(s[n/2+0:1]))
+ }
> head(airquality)
  Ozone Solar.R Wind Temp Month Day
1    41     190  7.4   67     5   1
2    36     118  8.0   72     5   2
3    12     149 12.6   74     5   3
4    18     313 11.5   62     5   4
5    NA      NA 14.3   56     5   5
6    28      NA 14.9   66     5   6
> print(mymedian(x$Temp))
[1] 79
> print(x[1:5,])
  Ozone Solar.R Wind Temp Month Day
1    41     190  7.4   67     5   1
2    36     118  8.0   72     5   2
3    12     149 12.6   74     5   3
4    18     313 11.5   62     5   4
5    NA      NA 14.3   56     5   5
> print(x[,1:2:2])
> print(x[order(x[,1]),])
    Ozone Solar.R Wind Temp Month Day
21      1       8  9.7   59     5  21
23      4      25  9.7   61     5  23
18      6      78 18.4   57     5  18
11      7      NA  6.9   74     5  11
76      7      48 14.3   80     7  15
147     7      49 10.3   69     9  24
9       8      19 20.1   61     5   9
```

94	9	24	13.8	81	8	2
114	9	36	14.3	72	8	22
137	9	24	10.9	71	9	14
73	10	264	14.3	73	7	12
13	11	290	9.2	66	5	13
20	11	44	9.7	62	5	20
22	11	320	16.6	73	5	22
3	12	149	12.6	74	5	3
50	12	120	11.5	73	6	19
51	13	137	10.3	76	6	20
138	13	112	11.5	71	9	15
141	13	27	10.3	76	9	18
144	13	238	12.6	64	9	21
14	14	274	10.9	68	5	14
16	14	334	11.5	64	5	16
148	14	20	16.6	63	9	25
151	14	191	14.3	75	9	28
12	16	256	9.7	69	5	12
82	16	7	6.9	74	7	21
95	16	77	7.4	82	8	3
143	16	201	8.0	82	9	20
4	18	313	11.5	62	5	4
15	18	65	13.2	58	5	15
140	18	224	13.8	67	9	17
152	18	131	8.0	76	9	29
8	19	99	13.8	59	5	8
49	20	37	9.2	65	6	18
87	20	81	8.6	82	7	26
130	20	252	10.9	80	9	7
153	20	223	11.5	68	9	30
47	21	191	14.9	77	6	16
113	21	259	15.5	77	8	21
132	21	230	10.9	75	9	9
135	21	259	15.5	76	9	12
108	22	71	10.3	77	8	16
7	23	299	8.6	65	5	7
28	23	13	12.0	67	5	28
44	23	148	8.0	82	6	13
110	23	115	7.4	76	8	18
131	23	220	10.3	78	9	8
145	23	14	9.2	71	9	22
133	24	259	9.7	73	9	10
142	24	238	10.3	68	9	19
74	27	175	14.9	81	7	13
6	28	NA	14.9	66	5	6
105	28	273	11.5	82	8	13
136	28	238	6.3	77	9	13
38	29	127	9.7	82	6	7
19	30	322	11.5	68	5	19
149	30	193	6.9	70	9	26
111	31	244	10.9	78	8	19
24	32	92	12.0	61	5	24
64	32	236	9.2	81	7	3
129	32	92	15.5	84	9	6
17	34	307	12.0	66	5	17
78	35	274	10.3	82	7	17
97	35	NA	7.4	85	8	5
2	36	118	8.0	72	5	2
146	36	139	10.3	81	9	23

31	37	279	7.4	76	5	31
48	37	284	20.7	72	6	17
41	39	323	11.5	87	6	10
93	39	83	6.9	81	8	1
67	40	314	10.9	83	7	6
1	41	190	7.4	67	5	1
104	44	192	11.5	86	8	12
112	44	190	10.3	78	8	20
134	44	236	14.9	81	9	11
29	45	252	14.9	81	5	29
116	45	212	9.7	79	8	24
139	46	237	6.9	78	9	16
128	47	95	7.4	87	9	5
77	48	260	6.9	81	7	16
63	49	248	9.2	85	7	2
90	50	275	7.4	86	7	29
88	52	82	12.0	86	7	27
92	59	254	9.2	81	7	31
109	59	51	6.3	79	8	17
79	61	285	6.3	84	7	18
81	63	220	11.5	85	7	20
66	64	175	4.6	83	7	5
91	64	253	7.4	83	7	30
106	65	157	9.7	80	8	14
98	66	NA	4.6	87	8	6
40	71	291	13.8	90	6	9
118	73	215	8.0	86	8	26
126	73	183	2.8	93	9	3
120	76	203	9.7	97	8	28
68	77	276	5.1	88	7	7
96	78	NA	6.9	86	8	4
125	78	197	5.1	92	9	2
80	79	187	5.1	87	7	19
85	80	294	8.6	86	7	24
89	82	213	7.4	88	7	28
122	84	237	6.3	96	8	30
71	85	175	7.4	89	7	10
123	85	188	6.3	94	8	31
100	89	229	10.3	90	8	8
127	91	189	4.6	93	9	4
124	96	167	6.9	91	9	1
69	97	267	6.3	92	7	8
70	97	272	5.7	92	7	9
86	108	223	8.0	85	7	25
101	110	207	8.0	90	8	9
30	115	223	5.7	79	5	30
121	118	225	2.3	94	8	29
99	122	255	4.0	89	8	7
62	135	269	4.1	84	7	1
117	168	238	3.4	81	8	25
5	NA	NA	14.3	56	5	5
10	NA	194	8.6	69	5	10
25	NA	66	16.6	57	5	25
26	NA	266	14.9	58	5	26
27	NA	NA	8.0	57	5	27
32	NA	286	8.6	78	6	1
33	NA	287	9.7	74	6	2
34	NA	242	16.1	67	6	3
35	NA	186	9.2	84	6	4

```
36      NA      220  8.6    85      6    5
37      NA      264 14.3    79      6    6
39      NA      273  6.9    87      6    8
42      NA      259 10.9    93      6   11
43      NA      250  9.2    92      6   12
45      NA      332 13.8    80      6   14
46      NA      322 11.5    79      6   15
52      NA      150  6.3    77      6   21
53      NA       59  1.7    76      6   22
54      NA       91  4.6    76      6   23
55      NA      250  6.3    76      6   24
56      NA      135  8.0    75      6   25
57      NA      127  8.0    78      6   26
58      NA       47 10.3    73      6   27
59      NA       98 11.5    80      6   28
60      NA       31 14.9    77      6   29
61      NA      138  8.0    83      6   30
65      NA      101 10.9    84      7    4
72      NA      139  8.6    82      7   11
75      NA      291 14.9    91      7   14
83      NA      258  9.7    81      7   22
84      NA      295 11.5    82      7   23
102     NA      222  8.6    92      8   10
103     NA      137 11.5    86      8   11
107     NA       64 11.5    79      8   15
115     NA      255 12.6    75      8   23
119     NA      153  5.7    88      8   27
150     NA      145 13.2    77      9   27
> print(min(x$Temp))
[1] 56
> print(max(x$Wind))
[1] 20.7
```

4. (i)Get the Summary Statistics of air quality dataset

```
> summary(airquality)
     Ozone            Solar.R           Wind             Temp      
Month
 Min.   :  1.00   Min.   :  7.0   Min.   : 1.700   Min.   :56.00   
Min.   :5.000
 1st Qu.: 18.00   1st Qu.:115.8   1st Qu.: 7.400   1st Qu.:72.00   1st 
Qu.:6.000
 Median : 31.50   Median :205.0   Median : 9.700   Median :79.00   
Median :7.000
 Mean   : 42.13   Mean   :185.9   Mean   : 9.958   Mean   :77.88   
Mean   :6.993
 3rd Qu.: 63.25   3rd Qu.:258.8   3rd Qu.:11.500   3rd Qu.:85.00   3rd 
Qu.:8.000
 Max.   :168.00   Max.   :334.0   Max.   :20.700   Max.   :97.00   
Max.   :9.000
 NA's   :37       NA's   :7
      Day      
 Min.   : 1.0  
 1st Qu.: 8.0  
 Median :16.0  
 Mean   :15.8  
 3rd Qu.:23.0  
 Max.   :31.0  
```

(ii)Melt airquality data set and display as a long – format data?

```
> View(ChickWeight)
> names(airquality) <- tolower(names(airquality))
> head(airquality)
  ozone solar.r wind temp month day
1    41     190  7.4   67     5   1
2    36     118  8.0   72     5   2
3    12     149 12.6   74     5   3
4    18     313 11.5   62     5   4
5    NA      NA 14.3   56     5   5
6    28      NA 14.9   66     5   6
> aql <- melt(airquality)
Using  as id variables
> head(aql)
  variable value
1    ozone    41
2    ozone    36
3    ozone    12
4    ozone    18
5    ozone    NA
6    ozone    28
```

(iii)Melt airquality data and specify month and day to be “ID variables”?

```
> aql <- melt(airquality, id.vars = c("month", "day"))
> head(aql)
  month day variable value
1     5   1    ozone    41
2     5   2    ozone    36
3     5   3    ozone    12
4     5   4    ozone    18
5     5   5    ozone    NA
6     5   6    ozone    28
```

(iv)Cast the molten airquality data set with respect to month and date features

```
aql <- melt(airquality, id.vars = c("month", "day"))
> aqw <- dcast(aql, month + day ~ variable)

> ##   month day ozone solar.r wind temp
> ## 1     5   1    41     190  7.4   67
> ## 2     5   2    36     118  8.0   72
> ## 3     5   3    12     149 12.6   74
> ## 4     5   4    18     313 11.5   62
> ## 5     5   5    NA      NA 14.3   56
> ## 6     5   6    28      NA 14.9   66
```

(v) Use cast function appropriately and compute the average of Ozone, Solar.R , Wind and temperature per month?

5.(i) Find any missing values(na) in features and drop the missing values if its less than 10%
else replace that with mean of that feature.
(ii) Apply a linear regression algorithm using Least Squares Method on “Ozone” and “Solar.R”
(iii)Plot Scatter plot between Ozone and Solar and add regression line created by above model

6. Load dataset named ChickWeight,
(i).Order the data frame, in ascending order by feature name “weight” grouped by feature
“diet” and Extract the last 6 records from order data frame.
(ii).a Perform melting function based on “Chick", "Time", "Diet" features as ID variables
b. Perform cast function to display the mean value of weight grouped by Diet
c. Perform cast function to display the mode of weight grouped by Diet

PROGRAM:-

```
head(ChickWeight)

tail(ChickWeight, 10L)

head(ChickWeight, -570L)

tail(ChickWeight, -570L)

chick0_ascend <- chick0[order(chick0$weight), ]

head(chick0_ascend, 15)

chick0_descend <- chick0[order(-chick0$weight), ]

head(chick0_descend, 15)
```

OUTPUT:-

```
> head(ChickWeight)
  weight Time Chick Diet
1     42    0     1    1
2     51    2     1    1
3     59    4     1    1
4     64    6     1    1
5     76    8     1    1
6     93   10     1    1
> tail(ChickWeight, 10L)
    weight Time Chick Diet
569     67    4    50    4
570     84    6    50    4
571    105    8    50    4
572    122   10    50    4
573    155   12    50    4
574    175   14    50    4
575    205   16    50    4
576    234   18    50    4
577    264   20    50    4
578    264   21    50    4
> head(ChickWeight, -570L)
  weight Time Chick Diet
1     42    0     1    1
2     51    2     1    1
3     59    4     1    1
4     64    6     1    1
5     76    8     1    1
6     93   10     1    1
7    106   12     1    1
8    125   14     1    1
> tail(ChickWeight, -570L)
    weight Time Chick Diet
571    105    8    50    4
572    122   10    50    4
```