ASA_Assignment_2

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R Markdown

```
Loading the data and dividing it in Train and Test
```

```
data<-read_excel("FinalDataSet_ASA.xlsx")
## 70% of the data for training
train_size <- floor(0.70 * nrow(data))

## set the seed to make your partition reproducible
set.seed(213)
train_ind <- sample(seq_len(nrow(data)),
                    size = train_size)
train <- data[train_ind,]
test <- data[-train_ind,]
```

Q1. Build a logistic regression equation to predict whether the person is likely to accept the bank's offer for a personal loan. If necessary, create new variables to improve the model performance.

```
Default.Model <- glm(train$`Personal Loan` ~ ., data=train, family = binomial)
summary(Default.Model)
```

```
##
## Call:
## glm(formula = train$`Personal Loan` ~ ., family = binomial, data = train)
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -2.59426  -0.15757  -0.04659  -0.01468   2.89222
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)          -7.651e+00  1.276e+01  -0.600  0.54879
## Age                  -9.970e-02  1.803e-01  -0.553  0.58027
## Experience            1.218e-01  1.799e-01   0.677  0.49822
## Income                5.680e-02  8.779e-03   6.470 9.79e-11 ***
## `ZIP Code`           -7.137e-05  1.295e-04  -0.551  0.58141
## Family                6.493e-01  2.242e-01   2.896  0.00378 **
## CCAvg                 3.519e-01  1.378e-01   2.554  0.01065 *
## Education             2.439e+00  4.240e-01   5.753 8.78e-09 ***
## Mortgage              5.663e-04  1.792e-03   0.316  0.75202
## `Securities Account`  5.799e-02  8.125e-01   0.071  0.94310
## `CD Account`          5.086e+00  9.696e-01   5.245 1.56e-07 ***
## Online               -1.452e-01  5.454e-01  -0.266  0.79003
## CreditCard           -1.660e+00  6.751e-01  -2.458  0.01396 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 395.14  on 699  degrees of freedom
## Residual deviance: 137.04  on 687  degrees of freedom
## AIC: 163.04
##
## Number of Fisher Scoring iterations: 8
```

Q2. Carry out the omnibus test to test whether the model as a whole is significant. Comment on the result of the omnibus test.

```
library(lmtest)
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
lrtest(Default.Model)
```

```
## Likelihood ratio test
##
## Model 1: train$`Personal Loan` ~ Age + Experience + Income + `ZIP Code` +
##     Family + CCAvg + Education + Mortgage + `Securities Account` +
##     `CD Account` + Online + CreditCard
## Model 2: train$`Personal Loan` ~ 1
##   #Df   LogLik  Df Chisq Pr(>Chisq)
## 1  13  -68.522
## 2   1 -197.571 -12 258.1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
  Here We reject the Model 2 as we have sufficient evidence that model 2(model with only intercept) is not good
(assumed value of alpha is 0.05).This means that atleast one of the coeff is significant.
```

Q3.Test the hypothesis that βj = 0 for all βj, where βj indicates the coefficient corresponding to jth explanatory variable. Comment on the result of these hypothesis tests.

```
summary(Default.Model)
```

```
##
## Call:
## glm(formula = train$`Personal Loan` ~ ., family = binomial, data = train)
##
## Deviance Residuals:
##      Min        1Q    Median        3Q       Max
## -2.59426  -0.15757  -0.04659  -0.01468   2.89222
##
## Coefficients:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)          -7.651e+00  1.276e+01  -0.600  0.54879
## Age                  -9.970e-02  1.803e-01  -0.553  0.58027
## Experience            1.218e-01  1.799e-01   0.677  0.49822
## Income                5.680e-02  8.779e-03   6.470 9.79e-11 ***
## `ZIP Code`           -7.137e-05  1.295e-04  -0.551  0.58141
## Family                6.493e-01  2.242e-01   2.896  0.00378 **
## CCAvg                 3.519e-01  1.378e-01   2.554  0.01065 *
## Education             2.439e+00  4.240e-01   5.753 8.78e-09 ***
## Mortgage              5.663e-04  1.792e-03   0.316  0.75202
## `Securities Account`  5.799e-02  8.125e-01   0.071  0.94310
## `CD Account`          5.086e+00  9.696e-01   5.245 1.56e-07 ***
## Online               -1.452e-01  5.454e-01  -0.266  0.79003
## CreditCard           -1.660e+00  6.751e-01  -2.458  0.01396 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 395.14  on 699  degrees of freedom
## Residual deviance: 137.04  on 687  degrees of freedom
## AIC: 163.04
##
## Number of Fisher Scoring iterations: 8
```

```
  Comment: In the above table, P value represents the Walds Test P Value. Thus only significant variables contrib
uting to the model are Income,Family,CCAvg,Education,CD Account, Credit Card. Rest of the coefficients are non si
gnificant.
```

Q4.Carry out the hypothesis test that the model fits the data. Comment on the results.

```
library(ResourceSelection)
```

```
## Warning: package 'ResourceSelection' was built under R version 4.1.3
```

```
## ResourceSelection 0.3-5   2019-07-22
```

```
hoslem.test(Default.Model$y, fitted(Default.Model))
```

```
##
##  Hosmer and Lemeshow goodness of fit (GOF) test
##
## data:  Default.Model$y, fitted(Default.Model)
## X-squared = 1.345, df = 8, p-value = 0.995
```

```
  From the above P value, we do not have sufficient evidence to reject Null hypothesis. This implies that model f
its the data well.
```

Q5.The bank would like to address the top 30 persons with an offer for personal loan based on the probability (propensity). Create a table displaying all the details of the "top" 30 persons who are most likely to accept the bank's offer. Make sure to include the probability of accepting the offer along with all the other details.

```
   Here we are including only test set to find the top 30 person who are most likely to accept bank offer based o
n probability
```

```
pred<-as.data.frame(predict(Default.Model,test[,-9],type = "response"))
pred
```

```
##     predict(Default.Model, test[, -9], type = "response")
## 1                                         8.418288e-04
## 2                                         9.956183e-01
## 3                                         1.609878e-01
## 4                                         2.644283e-03
## 5                                         1.508703e-02
## 6                                         4.307246e-04
## 7                                         1.418949e-03
## 8                                         6.176101e-04
## 9                                         6.516075e-02
## 10                                        7.047398e-02
## 11                                        1.280599e-03
## 12                                        1.221742e-03
## 13                                        2.809465e-02
## 14                                        1.727570e-04
## 15                                        6.176452e-03
## 16                                        1.979536e-05
## 17                                        2.081221e-04
## 18                                        1.724965e-02
## 19                                        7.774295e-03
## 20                                        2.030980e-05
## 21                                        6.434005e-03
## 22                                        8.839954e-01
## 23                                        7.218382e-04
## 24                                        6.911800e-04
## 25                                        6.010217e-04
## 26                                        2.810038e-02
## 27                                        1.796101e-04
## 28                                        1.874957e-05
## 29                                        2.038808e-04
## 30                                        2.115832e-04
## 31                                        4.931409e-02
## 32                                        6.391681e-02
## 33                                        1.689934e-04
## 34                                        2.349675e-01
## 35                                        1.160709e-02
## 36                                        9.990597e-01
## 37                                        1.198259e-01
## 38                                        1.241903e-02
## 39                                        1.014960e-02
## 40                                        1.734388e-03
## 41                                        1.099951e-02
## 42                                        1.020230e-03
## 43                                        9.414143e-01
## 44                                        9.994166e-01
## 45                                        1.531989e-01
## 46                                        1.981792e-02
## 47                                        2.182466e-03
## 48                                        3.290679e-04
## 49                                        1.878818e-04
## 50                                        4.119771e-03
## 51                                        3.185136e-04
## 52                                        9.920441e-01
## 53                                        8.090021e-02
## 54                                        7.836039e-04
## 55                                        8.079000e-02
## 56                                        4.511085e-03
## 57                                        1.206786e-03
## 58                                        1.310382e-04
## 59                                        9.994056e-01
## 60                                        6.333927e-04
## 61                                        1.810752e-06
## 62                                        1.384147e-02
## 63                                        4.366570e-03
## 64                                        2.981498e-02
## 65                                        1.473681e-01
## 66                                        6.082317e-03
## 67                                        2.404840e-02
## 68                                        1.521723e-05
## 69                                        4.157563e-04
## 70                                        6.944990e-01
## 71                                        2.377572e-04
## 72                                        2.810703e-01
## 73                                        1.668855e-04
## 74                                        1.424295e-02
## 75                                        3.785533e-03
## 76                                        1.941953e-02
## 77                                        1.010398e-01
## 78                                        9.193497e-01
## 79                                        8.551990e-05
## 80                                        6.297426e-04
## 81                                        5.910134e-03
## 82                                        9.167394e-06
## 83                                        5.046492e-05
## 84                                        3.463007e-04
## 85                                        9.260120e-02
## 86                                        1.679016e-03
## 87                                        3.399187e-04
## 88                                        1.075429e-04
## 89                                        1.626299e-03
## 90                                        2.075343e-02
## 91                                        6.724374e-03
## 92                                        3.307499e-01
## 93                                        7.058023e-03
## 94                                        5.065513e-02
## 95                                        1.863478e-03
## 96                                        7.680659e-03
## 97                                        2.593477e-01
## 98                                        7.659541e-04
## 99                                        1.185320e-01
## 100                                       1.701242e-05
## 101                                       9.957945e-01
## 102                                       8.525656e-05
## 103                                       1.886401e-03
## 104                                       1.312633e-04
## 105                                       7.894698e-05
## 106                                       6.400107e-02
## 107                                       4.969747e-02
## 108                                       9.979879e-04
## 109                                       5.435707e-03
## 110                                       6.807250e-04
## 111                                       8.906576e-05
## 112                                       1.024571e-01
## 113                                       6.512523e-04
## 114                                       9.212519e-02
## 115                                       4.432837e-03
## 116                                       6.333927e-04
## 117                                       1.875136e-03
## 118                                       7.722858e-01
## 119                                       9.984689e-01
## 120                                       1.053345e-03
## 121                                       8.985052e-07
## 122                                       8.878795e-03
## 123                                       1.243645e-04
## 124                                       1.400756e-01
## 125                                       8.155254e-04
## 126                                       2.809666e-04
## 127                                       1.397535e-05
## 128                                       1.995949e-04
## 129                                       6.179207e-03
## 130                                       1.747876e-03
## 131                                       2.083369e-06
## 132                                       2.262351e-01
## 133                                       1.131766e-03
## 134                                       1.299417e-02
## 135                                       2.201776e-02
## 136                                       7.576123e-04
## 137                                       1.251158e-04
## 138                                       3.202975e-01
## 139                                       8.878795e-03
## 140                                       4.187920e-03
## 141                                       8.092606e-05
## 142                                       2.964706e-04
## 143                                       3.247234e-03
## 144                                       1.247799e-02
## 145                                       1.110786e-01
## 146                                       3.246906e-03
## 147                                       1.236736e-01
## 148                                       3.007968e-04
## 149                                       4.357979e-02
## 150                                       1.817360e-01
## 151                                       7.540736e-03
## 152                                       3.426520e-04
## 153                                       1.434662e-05
## 154                                       7.521551e-05
## 155                                       8.167043e-03
## 156                                       5.100362e-03
## 157                                       1.628382e-06
## 158                                       2.332584e-03
## 159                                       5.131524e-02
## 160                                       1.783679e-03
## 161                                       3.309950e-03
## 162                                       7.069907e-05
## 163                                       3.037958e-06
## 164                                       9.887576e-01
## 165                                       6.786549e-03
## 166                                       1.075930e-02
## 167                                       4.026487e-02
## 168                                       5.977844e-04
## 169                                       7.935928e-02
## 170                                       1.676245e-02
## 171                                       8.155254e-04
## 172                                       5.755503e-04
## 173                                       1.626299e-03
## 174                                       7.099767e-04
## 175                                       1.020230e-03
## 176                                       7.143871e-01
## 177                                       3.784165e-04
## 178                                       3.938185e-03
## 179                                       1.146013e-03
## 180                                       4.961856e-04
## 181                                       7.097066e-04
## 182                                       3.291051e-02
## 183                                       2.151720e-03
## 184                                       2.225574e-02
## 185                                       3.800647e-05
## 186                                       3.507943e-01
## 187                                       1.178220e-05
## 188                                       2.252488e-02
## 189                                       2.133239e-03
## 190                                       3.530077e-04
## 191                                       3.728312e-03
## 192                                       2.085172e-01
## 193                                       3.242152e-02
## 194                                       1.420799e-03
## 195                                       2.324767e-03
## 196                                       7.875045e-03
## 197                                       6.076913e-02
## 198                                       1.703572e-03
## 199                                       1.221098e-03
## 200                                       7.707230e-03
## 201                                       2.586517e-02
## 202                                       1.241095e-02
## 203                                       2.634041e-03
## 204                                       3.232225e-03
## 205                                       1.088847e-02
## 206                                       4.903447e-06
## 207                                       3.048216e-05
## 208                                       5.423379e-03
## 209                                       2.718748e-04
## 210                                       4.186268e-02
## 211                                       1.556368e-03
## 212                                       2.229575e-03
## 213                                       3.744882e-03
## 214                                       8.193708e-04
## 215                                       1.587839e-05
## 216                                       1.978235e-04
## 217                                       1.487868e-03
## 218                                       9.082568e-02
## 219                                       1.236736e-01
## 220                                       1.986081e-02
## 221                                       1.852487e-03
## 222                                       1.594309e-02
## 223                                       9.995467e-01
## 224                                       1.089372e-01
## 225                                       1.757160e-03
## 226                                       1.520498e-02
## 227                                       9.994671e-01
## 228                                       3.547396e-03
## 229                                       1.300550e-03
## 230                                       7.330400e-03
## 231                                       9.973563e-03
## 232                                       1.459615e-04
## 233                                       5.407511e-04
## 234                                       9.894620e-04
## 235                                       1.077114e-03
## 236                                       4.117900e-04
## 237                                       5.002124e-01
## 238                                       1.529561e-03
## 239                                       1.093506e-03
## 240                                       6.885982e-02
## 241                                       9.680831e-04
## 242                                       1.052941e-04
## 243                                       1.531989e-01
## 244                                       1.791850e-02
## 245                                       3.099173e-02
## 246                                       3.322952e-04
## 247                                       1.551698e-04
## 248                                       5.401939e-01
## 249                                       5.325785e-03
## 250                                       3.082967e-02
## 251                                       1.383643e-02
## 252                                       6.694256e-05
## 253                                       2.372403e-03
## 254                                       2.516951e-02
## 255                                       1.031277e-02
## 256                                       1.419912e-02
## 257                                       1.151150e-04
## 258                                       5.568901e-03
## 259                                       1.813606e-01
## 260                                       9.973167e-01
## 261                                       2.647909e-02
## 262                                       1.545944e-02
## 263                                       4.305358e-02
## 264                                       1.891579e-02
## 265                                       1.307254e-02
## 266                                       4.779950e-04
## 267                                       2.081903e-03
## 268                                       6.966180e-05
## 269                                       5.553065e-05
## 270                                       6.197915e-01
## 271                                       1.576769e-03
## 272                                       5.937167e-05
## 273                                       1.138956e-03
## 274                                       2.173796e-03
## 275                                       1.958756e-05
## 276                                       9.995925e-01
## 277                                       8.058295e-06
## 278                                       5.327426e-03
## 279                                       5.020133e-06
## 280                                       4.177345e-01
## 281                                       6.990968e-05
## 282                                       7.429783e-04
## 283                                       3.163868e-02
## 284                                       2.261694e-04
## 285                                       4.065897e-05
## 286                                       1.698471e-01
## 287                                       2.324907e-04
## 288                                       4.117900e-04
## 289                                       2.750433e-03
## 290                                       1.599429e-03
## 291                                       1.790936e-03
## 292                                       1.595665e-03
## 293                                       1.429076e-04
## 294                                       7.509834e-05
## 295                                       6.166997e-02
## 296                                       3.052183e-02
## 297                                       1.007460e-03
## 298                                       1.318357e-04
## 299                                       1.194185e-03
## 300                                       7.281801e-02
```

```
test['Prob of Availing']<-pred
test1<-test[order(test$`Prob of Availing`,decreasing = TRUE),]
testLG<-head(test1,n=30)
testLG
```

```
## # A tibble: 30 x 14
##      Age Experience Income `ZIP Code` Family CCAvg Education Mortgage
##    <dbl>      <dbl>  <dbl>      <dbl>  <dbl> <dbl>     <dbl>    <dbl>
##  1    64         38    143      95039      2   6.4         3        0
##  2    50         26    192      90245      2   1.8         3      301
##  3    41         15    159      90057      1   5.5         3        0
##  4    53         28    175      95060      3   3.6         3        0
##  5    45         15    202      91380      3  10           3        0
##  6    43         19    174      92028      3   1.7         3      231
##  7    57         31    164      94607      2   3.8         3      422
##  8    56         32    173      94022      1   4.6         2       88
##  9    52         26    110      94501      2   5.4         3      204
## 10    47         23    170      90254      2   6.5         2        0
## # ... with 20 more rows, and 6 more variables: Personal Loan <dbl>,
## #   Securities Account <dbl>, CD Account <dbl>, Online <dbl>, CreditCard <dbl>,
## #   Prob of Availing <dbl>
```

Q6. Compare the above list of 30 persons against the 30 persons obtained from Discriminant Analysis (Assignment 1). Comment on the similarities and dissimilarities

```
lda.fit<-lda(data$`Personal Loan`~.,data=data,subset = train_ind)
#lda.fit
lda.pred <- predict(lda.fit, test)
probdf<-lda.pred$posterior
test['Prob of Availing LDA']<-probdf[,"1"]
test['class']<-lda.pred$class
testLDA<-test[order(test$`Prob of Availing LDA`,decreasing = TRUE),]
testLDA30<-head(testLDA,n=30)
summary(testLDA30)
```

```
##       Age          Experience        Income         ZIP Code
##  Min.   :27.00   Min.   : 0.00   Min.   : 49.0   Min.   :90057
##  1st Qu.:36.50   1st Qu.:12.25   1st Qu.:119.0   1st Qu.:91463
##  Median :46.50   Median :22.00   Median :153.5   Median :92352
##  Mean   :45.73   Mean   :20.40   Mean   :143.9   Mean   :92885
##  3rd Qu.:56.00   3rd Qu.:30.75   3rd Qu.:174.8   3rd Qu.:94452
##  Max.   :64.00   Max.   :38.00   Max.   :202.0   Max.   :95827
##      Family          CCAvg          Education        Mortgage
##  Min.   :1.000   Min.   : 0.300   Min.   :1.000   Min.   :  0.0
##  1st Qu.:1.000   1st Qu.: 1.925   1st Qu.:2.000   1st Qu.:  0.0
##  Median :2.000   Median : 3.550   Median :3.000   Median :  0.0
##  Mean   :2.267   Mean   : 3.960   Mean   :2.367   Mean   :115.3
##  3rd Qu.:3.000   3rd Qu.: 6.000   3rd Qu.:3.000   3rd Qu.:203.8
##  Max.   :4.000   Max.   :10.000   Max.   :3.000   Max.   :422.0
##  Personal Loan    Securities Account   CD Account         Online
##  Min.   :0.0000   Min.   :0.0000     Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000   1st Qu.:0.0000     1st Qu.:0.0000   1st Qu.:1.0000
##  Median :1.0000   Median :0.0000     Median :1.0000   Median :1.0000
##  Mean   :0.6667   Mean   :0.1667     Mean   :0.5333   Mean   :0.7667
##  3rd Qu.:1.0000   3rd Qu.:0.0000     3rd Qu.:1.0000   3rd Qu.:1.0000
##  Max.   :1.0000   Max.   :1.0000     Max.   :1.0000   Max.   :1.0000
##    CreditCard  Prob of Availing   Prob of Availing LDA class
##  Min.   :0.0   Min.   :0.007681   Min.   :0.1178       0:10
##  1st Qu.:0.0   1st Qu.:0.335761   1st Qu.:0.2913       1:20
##  Median :0.5   Median :0.828141   Median :0.8766
##  Mean   :0.5   Mean   :0.662669   Mean   :0.6847
##  3rd Qu.:1.0   3rd Qu.:0.996936   3rd Qu.:0.9994
##  Max.   :1.0   Max.   :0.999592   Max.   :0.9999
```

```
summary(testLG)
```

```
##       Age          Experience        Income         ZIP Code
##  Min.   :27.00   Min.   : 0.00   Min.   : 49.0   Min.   :90057
##  1st Qu.:41.00   1st Qu.:15.00   1st Qu.:115.0   1st Qu.:91521
##  Median :48.00   Median :23.00   Median :147.5   Median :92352
##  Mean   :48.40   Mean   :22.77   Mean   :143.7   Mean   :92788
##  3rd Qu.:57.75   3rd Qu.:31.75   3rd Qu.:173.8   3rd Qu.:94452
##  Max.   :65.00   Max.   :39.00   Max.   :202.0   Max.   :95819
##      Family          CCAvg          Education        Mortgage     Personal Loan
##  Min.   :1.000   Min.   : 0.300   Min.   :1.000   Min.   :  0.0   Min.   :0.0
##  1st Qu.:1.000   1st Qu.: 1.725   1st Qu.:3.000   1st Qu.:  0.0   1st Qu.:0.0
##  Median :2.000   Median : 3.250   Median :3.000   Median :  0.0   Median :1.0
##  Mean   :2.367   Mean   : 3.860   Mean   :2.667   Mean   :106.4   Mean   :0.7
##  3rd Qu.:3.750   3rd Qu.: 5.875   3rd Qu.:3.000   3rd Qu.:198.2   3rd Qu.:1.0
##  Max.   :4.000   Max.   :10.000   Max.   :3.000   Max.   :422.0   Max.   :1.0
##  Securities Account   CD Account         Online         CreditCard
##  Min.   :0.0000     Min.   :0.0000   Min.   :0.0000   Min.   :0.0000
##  1st Qu.:0.0000     1st Qu.:0.0000   1st Qu.:1.0000   1st Qu.:0.0000
##  Median :0.0000     Median :0.0000   Median :1.0000   Median :0.0000
##  Mean   :0.1667     Mean   :0.4333   Mean   :0.8333   Mean   :0.4333
##  3rd Qu.:0.0000     3rd Qu.:1.0000   3rd Qu.:1.0000   3rd Qu.:1.0000
##  Max.   :1.0000     Max.   :1.0000   Max.   :1.0000   Max.   :1.0000
##  Prob of Availing
##  Min.   :0.2085
##  1st Qu.:0.3675
##  Median :0.8281
##  Mean   :0.7060
##  3rd Qu.:0.9969
##  Max.   :0.9996
```

```
print("Education Count")
```

```
## [1] "Education Count"
```

```
table(testLG$Education)
```

```
##
##  1  2  3
##  3  4 23
```

```
table(testLDA30$Education)
```

```
##
##  1  2  3
##  7  5 18
```

```
print("CD Count")
```

```
## [1] "CD Count"
```

```
table(testLG$`CD Account`)
```

```
##
##  0  1
## 17 13
```

```
table(testLDA30$`CD Account`)
```

```
##
##  0  1
## 14 16
```

```
print("Credit Card Count")
```

```
## [1] "Credit Card Count"
```

```
table(testLG$CreditCard)
```

```
##
##  0  1
## 17 13
```

```
table(testLDA30$CreditCard)
```

```
##
##  0  1
## 15 15
```

```
print("CM for LDA for test set")
```

```
## [1] "CM for LDA for test set"
```

```
resultsLDA <- confusionMatrix(data=testLDA30$class, reference=as.factor(testLDA30$`Personal Loan`))
print(resultsLDA)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0  1
##          0  5  5
##          1  5 15
##
##                Accuracy : 0.6667
##                  95% CI : (0.4719, 0.8271)
##     No Information Rate : 0.6667
##     P-Value [Acc > NIR] : 0.5848
##
##                   Kappa : 0.25
##
##  Mcnemar's Test P-Value : 1.0000
##
##             Sensitivity : 0.5000
##             Specificity : 0.7500
##          Pos Pred Value : 0.5000
##          Neg Pred Value : 0.7500
##              Prevalence : 0.3333
##          Detection Rate : 0.1667
##    Detection Prevalence : 0.3333
##       Balanced Accuracy : 0.6250
##
##        'Positive' Class : 0
##
```

```
print("CM for LR for test set")
```

```
## [1] "CM for LR for test set"
```

```
predicted<-as.numeric(testLG$`Prob of Availing`>0.5)
resultsLG<-confusionMatrix(data = as.factor(predicted), reference = as.factor(testLG$`Personal Loan`))
print(resultsLG)
```

```
## Confusion Matrix and Statistics
##
##           Reference
## Prediction  0  1
##          0  6  3
##          1  3 18
##
##                Accuracy : 0.8
##                  95% CI : (0.6143, 0.9229)
##     No Information Rate : 0.7
##     P-Value [Acc > NIR] : 0.1595
##
##                   Kappa : 0.5238
##
##  Mcnemar's Test P-Value : 1.0000
##
##             Sensitivity : 0.6667
##             Specificity : 0.8571
##          Pos Pred Value : 0.6667
##          Neg Pred Value : 0.8571
##              Prevalence : 0.3000
##          Detection Rate : 0.2000
##    Detection Prevalence : 0.3000
##       Balanced Accuracy : 0.7619
##
##        'Positive' Class : 0
##
```

```
    1. we see similarities in both the output's with respect to age,income,family, and CCAvg,securities Account
    2. We can see that there are more people with education as UG and Graduate in LDA than in Logistic.
    3. We see that in LDA, more number of people are there who have Certificate of Deposit
    4. We also see that number of people who use credit are more in LDA than in Logistic Regression
    5. We also see improved level of accuracy,specificity and sensitivity for Logistic Regression as compared to
LDA for test data.
```