

Logistic Regression

Problem statement 1

Output variable -> y

y -> Whether the client has subscribed a term deposit or not

Answer:

Rcode:

```
library(readxl)
bank <- read_xls("E:/data science/assignments/Logistic Regression/bank-full.xls")
View(bank)
colnames(bank)
class(bank)
summary(bank)
str(bank)
dim(bank)
bank <- bank[,-9]
bank <- bank[,-15]
library(plyr)
bank$default <- as.numeric(revalue(bank$default,c("yes"=1, "no"=0)))
bank$housing <- as.numeric(revalue(bank$housing,c("yes"=1,"no"=0)))
bank$loan <- as.numeric(revalue(bank$loan,c("yes"=1,"no"=0)))
View(bank)
qqnorm(bank$age)
qqnorm(bank$default)
qqnorm(bank$balance)
qqnorm(bank$housing)
qqnorm(bank$loan)
qqnorm(bank$duration)
```

```
qqnorm(bank$campaign)
```

```
qqnorm(bank$pdays)
```

```
qqnorm(bank$previous)
```

```
hist(bank$age)
```

```
hist(bank$default)
```

```
hist(bank$balance)
```

```
hist(bank$housing)
```

```
hist(bank$loan)
```

```
hist(bank$duration)
```

```
hist(bank$campaign)
```

```
hist(bank$pdays)
```

```
hist(bank$previous)
```

```
library(moments)
```

```
skewness(bank$age)
```

```
skewness(bank$default)
```

```
skewness(bank$balance)
```

```
skewness(bank$housing)
```

```
skewness(bank$loan)
```

```
skewness(bank$duration)
```

```
skewness(bank$campaign)
```

```
skewness(bank$pdays)
```

```
skewness(bank$previous)
```

```
fit1 <- glm(loan~housing+default+campaign+pdays+previous+y+balance+duration,data  
= bank,family = "binomial")
```

```
summary(fit1)
```

```
prob1 <- predict(fit1,type = "response")
```

```

logit1 <-
glm(loan~factor(housing)+factor(default)+factor(campaign)+factor(pdays)+balance+dura
tion,family= binomial,data=bank)

summary(logit1)

exp(coef(logit1))

library(MASS)

library(car)

stepAIC(fit1)

prob <- predict(logit1,type = c("response"),bank)
prob
final_y <- cbind(bank, prob)
confusion_y <- table(prob>0.5, bank$y)
table(prob>0.5)
confusion_y
Accuracy1 <- sum(diag(confusion_y)/sum(confusion_y))
Accuracy1

threshold=0.5
predicted_values<-ifelse(predict(fit1,type="response")>threshold,1,0)
actual_values<-fit1$y
conf_matrix<-table(predicted_values,actual_values)
conf_matrix

library(caret)
specificity(conf_matrix)

```

```
sensitivity(conf_matrix)
```

```
Accuracy <- sum(diag(conf_matrix)/sum(conf_matrix))
```

```
Accuracy
```

```
#changing threshold
```

```
threshold=0.8
```

```
predicted_values<-ifelse(predict(fit1,type="response")>threshold,1,0)
```

```
actual_values<-fit1$y
```

```
conf_matrix1<-table(predicted_values,actual_values)
```

```
conf_matrix1
```

```
Accuracy2 <- sum(diag(conf_matrix1)/sum(conf_matrix1))
```

```
Accuracy2
```

```
##Roc curve
```

```
library(ROCR)
```

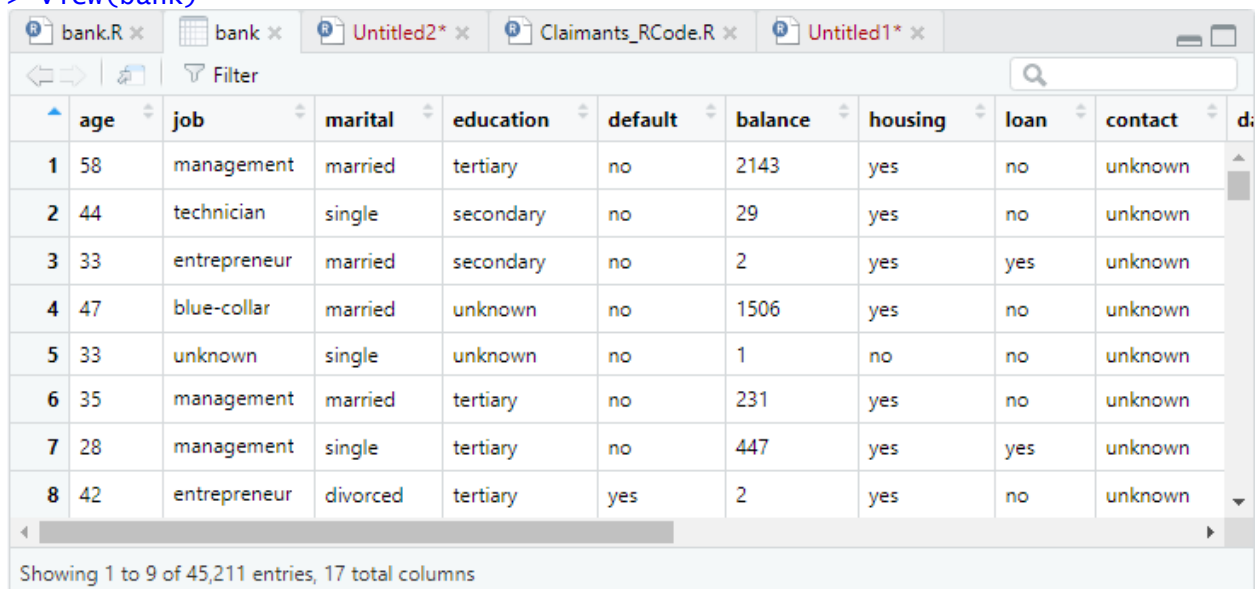
```
rocpred <- prediction(prob, bank$loan)
```

```
rocprof <- performance(rocpred, "tpr", "fpr")
```

```
plot(rocprof, colsize=T, text.adj=c(0.2, 1.7))
```

Console:

```
> library(readxl)
> bank <- read_xls("E:/data science/assignments/Logistic Regression/bank-full.xls")
> view(bank)
```



	age	job	marital	education	default	balance	housing	loan	contact	default
1	58	management	married	tertiary	no	2143	yes	no	unknown	
2	44	technician	single	secondary	no	29	yes	no	unknown	
3	33	entrepreneur	married	secondary	no	2	yes	yes	unknown	
4	47	blue-collar	married	unknown	no	1506	yes	no	unknown	
5	33	unknown	single	unknown	no	1	no	no	unknown	
6	35	management	married	tertiary	no	231	yes	no	unknown	
7	28	management	single	tertiary	no	447	yes	yes	unknown	
8	42	entrepreneur	divorced	tertiary	yes	2	yes	no	unknown	

Showing 1 to 9 of 45,211 entries, 17 total columns

```

> colnames(bank)
[1] "age"      "job"      "marital"  "education" "default"  "balance"
[7] "housing"  "loan"     "contact"  "day"       "month"    "duration"
[13] "campaign" "pdays"   "previous" "poutcome"  "y"
> class(bank)
[1] "tbl_df"      "tbl"      "data.frame"
> summary(bank)
   age          job          marital          education
Min.   :18.00   Length:45211   Length:45211   Length:45211
1st Qu.:33.00   Class :character   Class :character   Class :character
Median :39.00   Mode  :character   Mode  :character   Mode  :character
Mean    :40.94
3rd Qu.:48.00
Max.    :95.00

   default          balance          housing          loan
Length:45211   Min.   : -8019   Length:45211   Length:45211
Class :character 1st Qu.:  72   Class :character   Class :character
Mode  :character Median : 448   Mode  :character   Mode  :character
                Mean    : 1362
                3rd Qu.: 1428
                Max.    :102127

   contact          day          month          duration
Length:45211   Min.   : 1.00   Length:45211   Min.   : 0.0
Class :character 1st Qu.: 8.00   Class :character 1st Qu.: 103.0
Mode  :character Median :16.00   Mode  :character Median : 180.0
                Mean    :15.81
                3rd Qu.:21.00
                Max.    :31.00
                Mean    : 258.2
                3rd Qu.: 319.0
                Max.    :4918.0

   campaign          pdays          previous          poutcome
Min.   : 1.000   Min.   : -1.0   Min.   : 0.0000   Length:45211
1st Qu.: 1.000   1st Qu.: -1.0   1st Qu.: 0.0000   Class :character
Median : 2.000   Median : -1.0   Median : 0.0000   Mode  :character
Mean    : 2.764   Mean    : 40.2   Mean    : 0.5803
3rd Qu.: 3.000   3rd Qu.: -1.0   3rd Qu.: 0.0000
Max.    :63.000   Max.    :871.0   Max.    :275.0000

   y
Length:45211
Class :character
Mode  :character

> str(bank)
Classes 'tbl_df', 'tbl' and 'data.frame': 45211 obs. of 17 variables:
 $ age      : num  58 44 33 47 33 35 28 42 58 43 ...
 $ job      : chr   "management" "technician" "entrepreneur" "blue-collar" ...
 $ marital  : chr   "married" "single" "married" "married" ...
 $ education: chr   "tertiary" "secondary" "secondary" "unknown" ...
 $ default  : chr   "no" "no" "no" "no" ...
 $ balance  : num  2143 29 2 1506 1 ...
 $ housing  : chr   "yes" "yes" "yes" "yes" ...
 $ loan     : chr   "no" "no" "yes" "no" ...
 $ contact  : chr   "unknown" "unknown" "unknown" "unknown" ...
 $ day      : num  5 5 5 5 5 5 5 5 5 5 ...
 $ month    : chr   "may" "may" "may" "may" ...
 $ duration : num  261 151 76 92 198 139 217 380 50 55 ...
 $ campaign : num  1 1 1 1 1 1 1 1 1 1 ...
 $ pdays    : num  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
 $ previous : num  0 0 0 0 0 0 0 0 0 0 ...
 $ poutcome : chr   "unknown" "unknown" "unknown" "unknown" ...
 $ y        : chr   "no" "no" "no" "no" ...

> dim(bank)
[1] 45211 17
> bank <- bank[,-9]
> bank <- bank[,-15]
> library(plyr)
> bank$default <- as.numeric(revalue(bank$default,c("yes"=1, "no"=0)))
> bank$housing <- as.numeric(revalue(bank$housing,c("yes"=1,"no"=0)))
> bank$loan <- as.numeric(revalue(bank$loan,c("yes"=1,"no"=0)))

```

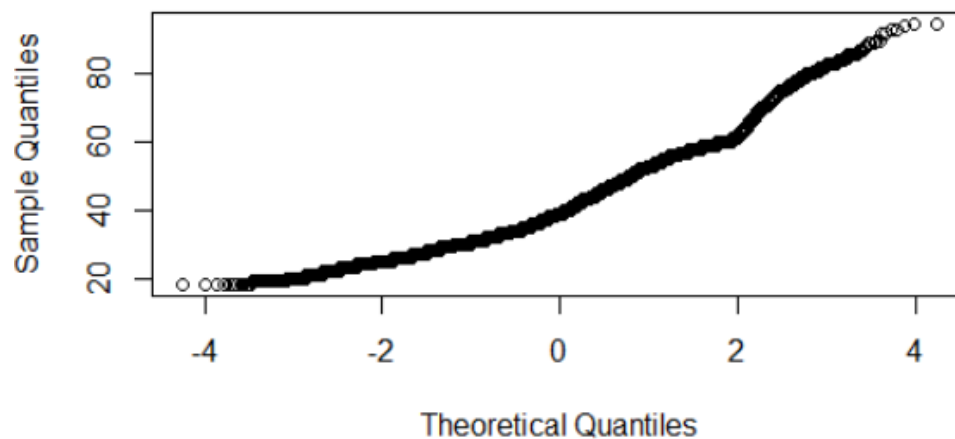
```
> view(bank)
```

	age	job	marital	education	default	balance	housing	loan	day
1	58	management	married	tertiary	0	2143	1	0	5
2	44	technician	single	secondary	0	29	1	0	5
3	33	entrepreneur	married	secondary	0	2	1	1	5
4	47	blue-collar	married	unknown	0	1506	1	0	5
5	33	unknown	single	unknown	0	1	0	0	5
6	35	management	married	tertiary	0	231	1	0	5
7	28	management	single	tertiary	0	447	1	1	5
8	42	entrepreneur	divorced	tertiary	1	2	1	0	5

Showing 1 to 9 of 45,211 entries, 15 total columns

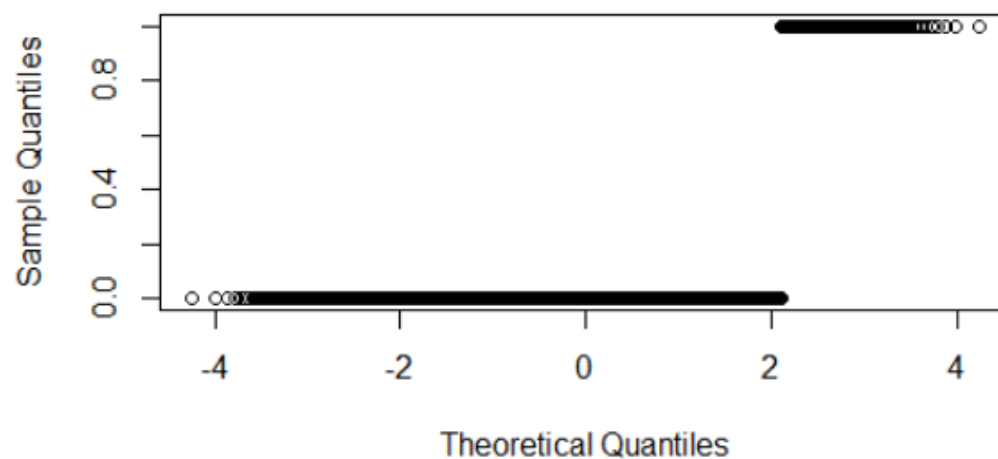
```
> qqnorm(bank$age)
```

Normal Q-Q Plot

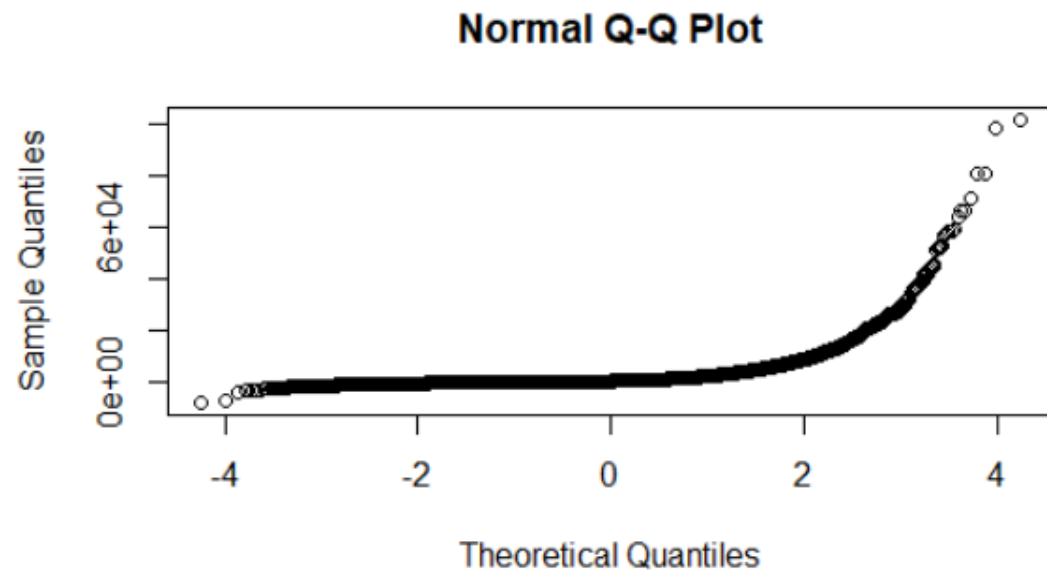


```
> qqnorm(bank$default)
```

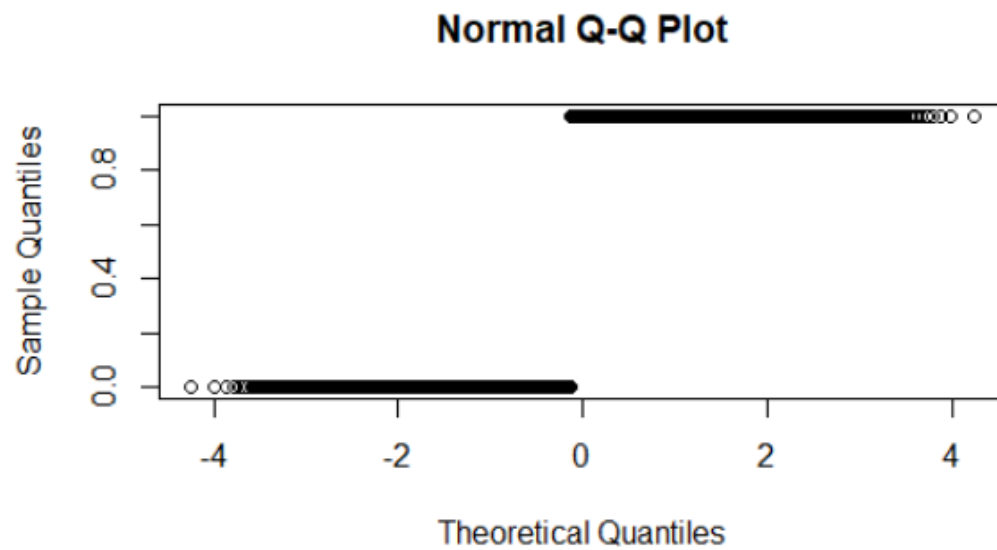
Normal Q-Q Plot



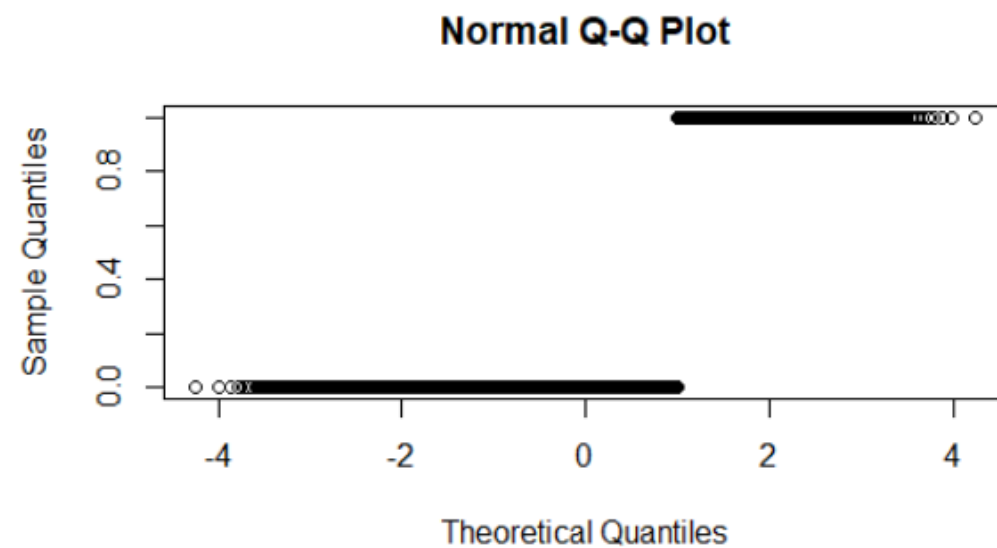
```
> qqnorm(bank$balance)
```



```
> qqnorm(bank$housing)
```

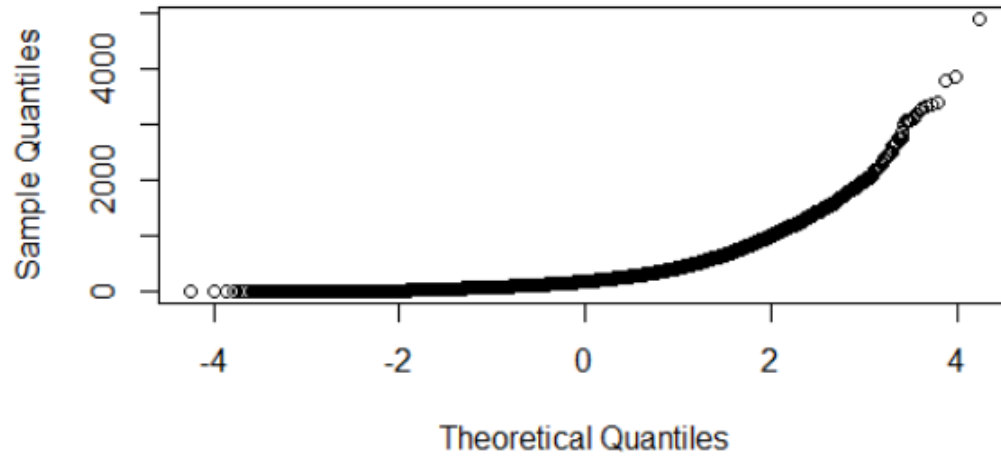


```
> qqnorm(bank$loan)
```



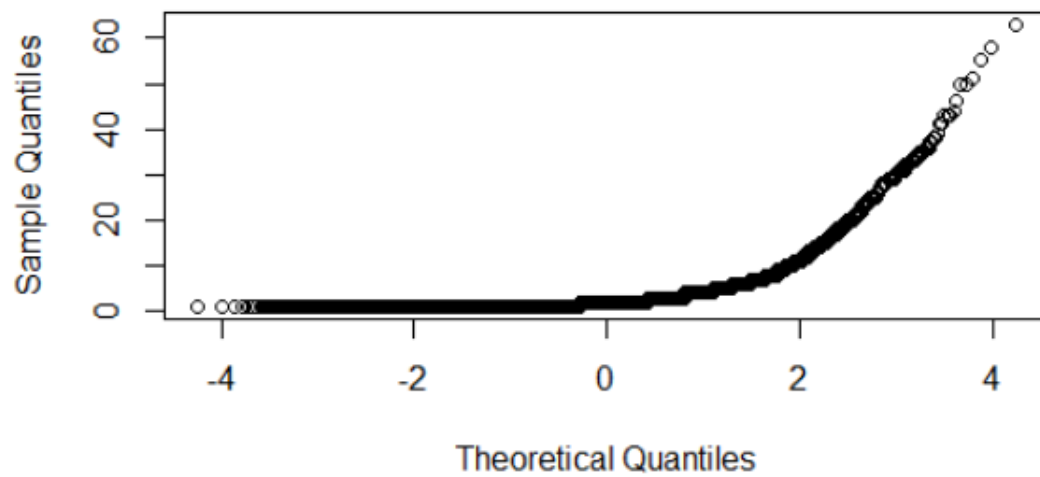
```
> qqnorm(bank$duration)
```

Normal Q-Q Plot



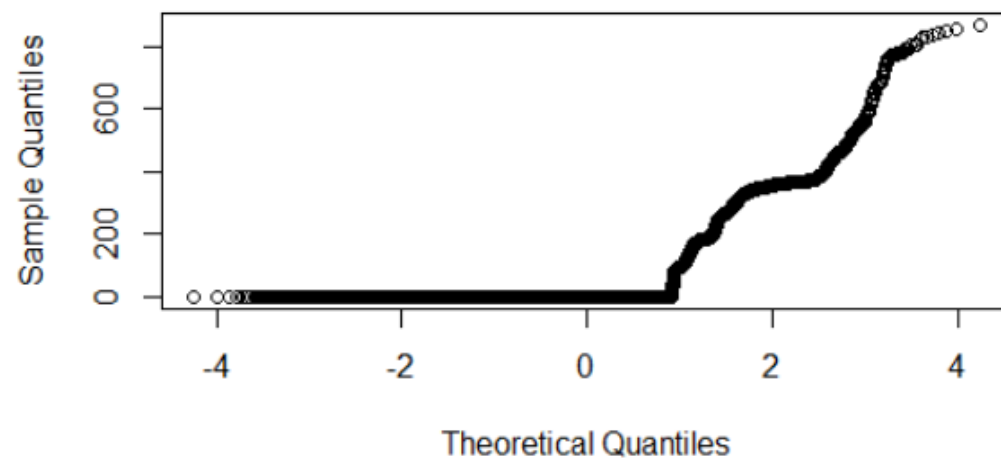
```
> qqnorm(bank$campaign)
```

Normal Q-Q Plot

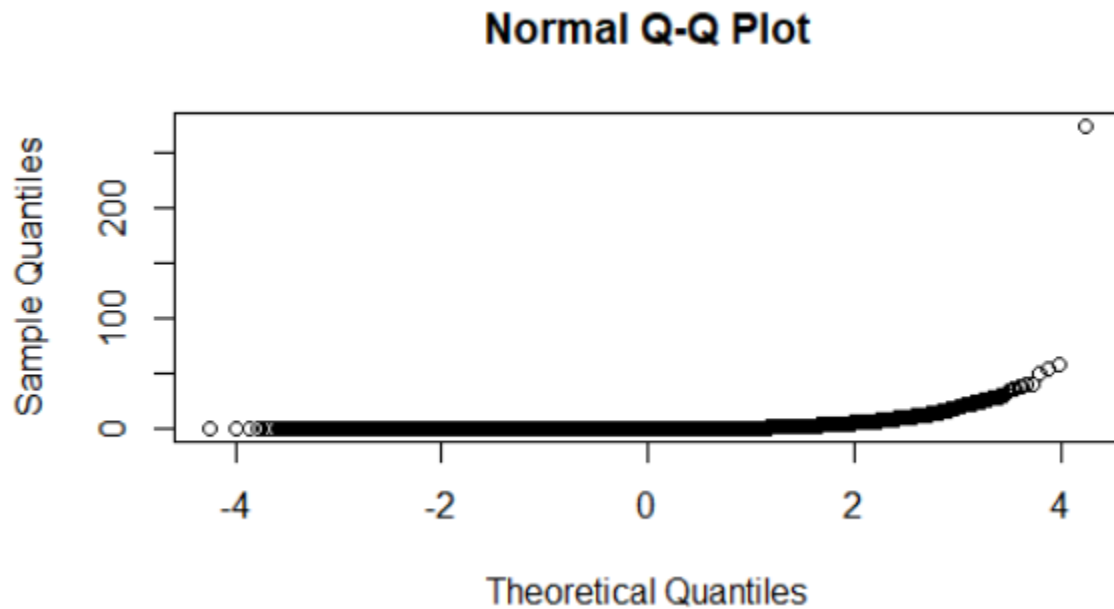


```
> qqnorm(bank$pdays)
```

Normal Q-Q Plot




```
> qqnorm(bank$previous)
```



```
> hist(bank$age)
> hist(bank$default)
> hist(bank$balance)
> hist(bank$housing)
> hist(bank$loan)
> hist(bank$duration)
> hist(bank$campaign)
> hist(bank$pdays)
> hist(bank$previous)
> library(moments)
> skewness(bank$age)
[1] 0.6847952
> skewness(bank$default)
[1] 7.245135
> skewness(bank$balance)
[1] 8.360031
> skewness(bank$housing)
[1] -0.2247587
> skewness(bank$loan)
[1] 1.852556
> skewness(bank$duration)
[1] 3.144214
> skewness(bank$campaign)
[1] 4.898488
> skewness(bank$pdays)
[1] 2.615629
> skewness(bank$previous)
[1] 41.84507
```

```
> fit1 <- glm(loan~housing+default+campaign+pdays+previous+y+balance+duration,data
= bank,family = "binomial")
> summary(fit1)
```

```
Call:
glm(formula = loan ~ housing + default + campaign + pdays + previous +
    y + balance + duration, family = "binomial", data = bank)
```

```
Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.2452  -0.6342  -0.5910  -0.4344   4.3063
```

```
Coefficients:
```

	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-1.592e+00	2.889e-02	-55.114	< 2e-16	***
housing	1.628e-01	2.688e-02	6.059	1.37e-09	***
default	9.405e-01	7.471e-02	12.589	< 2e-16	***
campaign	2.550e-03	4.074e-03	0.626	0.531427	
pdays	-5.643e-04	1.504e-04	-3.751	0.000176	***
previous	6.355e-03	5.540e-03	1.147	0.251356	
yyes	-6.535e-01	5.412e-02	-12.074	< 2e-16	***
balance	-1.505e-04	8.666e-06	-17.369	< 2e-16	***
duration	1.847e-04	5.528e-05	3.340	0.000837	***

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 39790 on 45210 degrees of freedom
 Residual deviance: 38835 on 45202 degrees of freedom
 AIC: 38853

Number of Fisher Scoring iterations: 5

```
> prob1 <- predict(fit1,type = "response")
> logit1 <- glm(loan~factor(housing)+factor(default)+factor(campaign)+factor(pdays)
+balance+duration,family= binomial,data=bank)
> summary(logit1)
```

Call:
 glm(formula = loan ~ factor(housing) + factor(default) + factor(campaign) +
 factor(pdays) + balance + duration, family = binomial, data = bank)

Deviance Residuals:

Min	1Q	Median	3Q	Max
-1.7892	-0.6346	-0.5836	-0.3976	4.3563

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-1.546e+00	3.162e-02	-48.894	< 2e-16	***
factor(housing)1	1.861e-01	2.718e-02	6.848	7.49e-12	***
factor(default)1	9.382e-01	7.508e-02	12.497	< 2e-16	***
factor(campaign)2	-5.756e-02	3.276e-02	-1.757	0.078954	.
factor(campaign)3	-1.086e-02	4.274e-02	-0.254	0.799324	
factor(campaign)4	-4.353e-02	5.132e-02	-0.848	0.396405	
factor(campaign)5	-5.755e-02	6.923e-02	-0.831	0.405816	
factor(campaign)6	-3.028e-02	8.003e-02	-0.378	0.705159	
factor(campaign)7	-5.311e-03	1.037e-01	-0.051	0.959140	
factor(campaign)8	-9.147e-02	1.223e-01	-0.748	0.454461	
factor(campaign)9	-2.546e-01	1.657e-01	-1.536	0.124558	
factor(campaign)10	1.984e-01	1.570e-01	1.264	0.206243	
factor(campaign)11	-2.736e-02	1.918e-01	-0.143	0.886567	
factor(campaign)12	-2.362e-01	2.368e-01	-0.998	0.318472	
factor(campaign)13	5.326e-02	2.286e-01	0.233	0.815762	
factor(campaign)14	-5.628e-01	3.386e-01	-1.662	0.096523	.
factor(campaign)15	1.115e-01	2.800e-01	0.398	0.690642	
factor(campaign)16	4.371e-01	2.631e-01	1.662	0.096585	.
factor(campaign)17	-3.549e-01	3.617e-01	-0.981	0.326472	
factor(campaign)18	2.712e-02	3.717e-01	0.073	0.941838	
factor(campaign)19	8.418e-02	3.945e-01	0.213	0.831030	
factor(campaign)20	2.589e-01	3.817e-01	0.678	0.497729	
factor(campaign)21	-1.734e-02	4.524e-01	-0.038	0.969423	
factor(campaign)22	1.372e-01	5.125e-01	0.268	0.788860	
factor(campaign)23	-7.977e-01	7.482e-01	-1.066	0.286365	
factor(campaign)24	3.830e-01	5.178e-01	0.740	0.459485	
factor(campaign)25	3.279e-01	5.263e-01	0.623	0.533250	
factor(campaign)26	-2.100e-01	7.697e-01	-0.273	0.784933	
factor(campaign)27	1.225e+00	6.533e-01	1.875	0.060756	.
factor(campaign)28	-2.425e-02	6.454e-01	-0.038	0.970024	
factor(campaign)29	1.307e+00	5.094e-01	2.566	0.010298	*
factor(campaign)30	1.074e+00	7.361e-01	1.459	0.144479	

factor(campaign)31	4.465e-01	6.778e-01	0.659	0.510117
factor(campaign)32	2.637e-01	8.032e-01	0.328	0.742673
factor(campaign)33	8.473e-01	8.685e-01	0.975	0.329313
factor(campaign)34	1.365e-01	1.119e+00	0.122	0.902954
factor(campaign)35	-1.493e+01	1.191e+03	-0.013	0.989995
factor(campaign)36	1.455e+00	1.035e+00	1.405	0.160035
factor(campaign)37	-1.496e+01	1.693e+03	-0.009	0.992950
factor(campaign)38	-1.514e+01	1.384e+03	-0.011	0.991276
factor(campaign)39	-1.520e+01	2.400e+03	-0.006	0.994945
factor(campaign)41	-1.505e+01	1.694e+03	-0.009	0.992911
factor(campaign)43	6.524e-01	1.225e+00	0.532	0.594411
factor(campaign)44	-1.515e+01	2.400e+03	-0.006	0.994963
factor(campaign)46	-1.516e+01	2.400e+03	-0.006	0.994959
factor(campaign)50	1.424e+00	1.414e+00	1.007	0.314107
factor(campaign)51	-1.514e+01	2.400e+03	-0.006	0.994965
factor(campaign)55	-1.504e+01	2.400e+03	-0.006	0.994998
factor(campaign)58	-1.519e+01	2.400e+03	-0.006	0.994951
factor(campaign)63	-1.380e+01	2.400e+03	-0.006	0.995410
factor(pdays)1	-1.036e+00	1.036e+00	-1.000	0.317495
factor(pdays)2	3.073e-01	4.009e-01	0.767	0.443287
factor(pdays)3	-1.495e+01	2.400e+03	-0.006	0.995028
factor(pdays)4	-1.473e+01	1.694e+03	-0.009	0.993065
factor(pdays)5	1.342e-01	7.835e-01	0.171	0.864000
factor(pdays)6	-1.495e+01	7.583e+02	-0.020	0.984271
factor(pdays)7	1.238e+00	7.699e-01	1.608	0.107837
factor(pdays)8	7.092e-01	4.487e-01	1.581	0.113991
factor(pdays)9	-8.322e-01	1.045e+00	-0.796	0.425931
factor(pdays)10	1.091e-01	1.101e+00	0.099	0.921081
factor(pdays)12	6.216e-01	8.380e-01	0.742	0.458247
factor(pdays)13	-1.494e+01	9.759e+02	-0.015	0.987784
factor(pdays)14	-1.496e+01	7.993e+02	-0.019	0.985070
factor(pdays)15	-1.505e+01	1.382e+03	-0.011	0.991308
factor(pdays)17	-1.501e+01	1.199e+03	-0.013	0.990014
factor(pdays)18	-1.506e+01	2.400e+03	-0.006	0.994993
factor(pdays)19	-1.512e+01	1.697e+03	-0.009	0.992889
factor(pdays)20	-1.507e+01	1.696e+03	-0.009	0.992912
factor(pdays)21	4.849e-01	1.156e+00	0.419	0.674926
factor(pdays)22	-1.500e+01	1.382e+03	-0.011	0.991341
factor(pdays)24	-1.496e+01	1.692e+03	-0.009	0.992944
factor(pdays)25	-1.490e+01	2.400e+03	-0.006	0.995046
factor(pdays)26	-1.510e+01	2.400e+03	-0.006	0.994980
factor(pdays)27	-1.477e+01	1.193e+03	-0.012	0.990122
factor(pdays)28	4.371e-01	8.079e-01	0.541	0.588439
factor(pdays)29	-1.500e+01	1.383e+03	-0.011	0.991344
factor(pdays)30	-1.515e+01	2.400e+03	-0.006	0.994964
factor(pdays)31	-1.449e+01	1.004e+03	-0.014	0.988490
factor(pdays)32	-1.504e+01	2.400e+03	-0.006	0.995001
factor(pdays)33	-1.490e+01	1.697e+03	-0.009	0.992995
factor(pdays)34	-1.414e+01	1.632e+03	-0.009	0.993087
factor(pdays)35	-1.449e+01	8.117e+02	-0.018	0.985761
factor(pdays)36	-1.482e+01	1.186e+03	-0.013	0.990026
factor(pdays)37	-1.455e+01	1.188e+03	-0.012	0.990230
factor(pdays)38	-1.450e+01	1.383e+03	-0.010	0.991636
factor(pdays)39	-1.500e+01	1.696e+03	-0.009	0.992944
factor(pdays)40	-1.492e+01	9.045e+02	-0.016	0.986843
factor(pdays)41	-1.461e+01	1.069e+03	-0.014	0.989095
factor(pdays)42	-1.459e+01	1.301e+03	-0.011	0.991055
factor(pdays)43	-1.487e+01	1.686e+03	-0.009	0.992963
factor(pdays)44	-1.453e+01	1.372e+03	-0.011	0.991551
factor(pdays)45	-1.486e+01	2.400e+03	-0.006	0.995057
factor(pdays)46	-1.456e+01	1.663e+03	-0.009	0.993016
factor(pdays)47	-1.499e+01	2.400e+03	-0.006	0.995014
factor(pdays)48	8.285e-01	1.164e+00	0.712	0.476572
factor(pdays)49	1.216e+00	1.266e+00	0.961	0.336746
factor(pdays)50	-3.099e-01	1.071e+00	-0.289	0.772365
factor(pdays)51	-1.488e+01	2.400e+03	-0.006	0.995053
factor(pdays)52	-1.483e+01	1.694e+03	-0.009	0.993015
factor(pdays)53	-1.495e+01	1.384e+03	-0.011	0.991377

factor(pdays)54	-1.481e+01	2.400e+03	-0.006	0.995077	
factor(pdays)55	-1.489e+01	1.188e+03	-0.013	0.989993	
factor(pdays)56	-1.463e+01	1.061e+03	-0.014	0.989003	
factor(pdays)57	-1.475e+01	8.401e+02	-0.018	0.985991	
factor(pdays)58	-1.468e+01	1.373e+03	-0.011	0.991469	
factor(pdays)59	1.612e+00	1.415e+00	1.139	0.254578	
factor(pdays)60	9.207e-01	8.483e-01	1.085	0.277716	
factor(pdays)61	-1.512e+01	1.199e+03	-0.013	0.989938	
factor(pdays)62	2.830e-01	1.130e+00	0.250	0.802309	
factor(pdays)63	-1.477e+01	7.934e+02	-0.019	0.985149	
factor(pdays)64	1.194e+00	7.452e-01	1.602	0.109162	
factor(pdays)65	-1.492e+01	2.400e+03	-0.006	0.995039	
factor(pdays)66	-1.500e+01	1.383e+03	-0.011	0.991346	
factor(pdays)67	-1.494e+01	9.783e+02	-0.015	0.987812	
factor(pdays)68	-1.498e+01	1.198e+03	-0.013	0.990026	
factor(pdays)69	-1.476e+01	1.182e+03	-0.012	0.990039	
factor(pdays)70	-1.479e+01	8.926e+02	-0.017	0.986776	
factor(pdays)71	-1.459e+01	9.163e+02	-0.016	0.987299	
factor(pdays)72	-1.478e+01	1.689e+03	-0.009	0.993017	
factor(pdays)73	-1.486e+01	1.068e+03	-0.014	0.988902	
factor(pdays)74	1.345e-01	1.092e+00	0.123	0.901976	
factor(pdays)75	-1.465e+01	8.971e+02	-0.016	0.986973	
factor(pdays)76	2.027e-01	1.120e+00	0.181	0.856295	
factor(pdays)77	-2.626e-01	1.063e+00	-0.247	0.804894	
factor(pdays)78	-1.473e+01	6.321e+02	-0.023	0.981412	
factor(pdays)79	-9.983e-01	1.037e+00	-0.962	0.335912	
factor(pdays)80	-1.481e+01	5.637e+02	-0.026	0.979033	
factor(pdays)81	2.473e-01	7.894e-01	0.313	0.754069	
factor(pdays)82	-5.767e-01	1.052e+00	-0.548	0.583455	
factor(pdays)83	-1.181e+00	1.028e+00	-1.149	0.250539	
factor(pdays)84	-1.403e+00	1.022e+00	-1.373	0.169889	
factor(pdays)85	-2.823e-02	4.909e-01	-0.057	0.954147	
factor(pdays)86	-1.441e+00	1.021e+00	-1.412	0.158059	
factor(pdays)87	-1.937e+00	1.013e+00	-1.911	0.055948	.
factor(pdays)88	-1.483e+01	4.435e+02	-0.033	0.973329	
factor(pdays)89	-9.427e-01	7.339e-01	-1.285	0.198964	
factor(pdays)90	-2.217e+00	1.010e+00	-2.195	0.028199	*
factor(pdays)91	-1.226e+00	4.195e-01	-2.922	0.003477	**
factor(pdays)92	-1.568e+00	4.561e-01	-3.438	0.000585	***
factor(pdays)93	-7.303e-01	4.671e-01	-1.563	0.117968	
factor(pdays)94	-1.817e+00	7.180e-01	-2.531	0.011377	*
factor(pdays)95	-1.347e+00	5.907e-01	-2.280	0.022602	*
factor(pdays)96	2.063e-01	3.527e-01	0.585	0.558656	
factor(pdays)97	-5.831e-01	5.230e-01	-1.115	0.264857	
factor(pdays)98	-1.371e-01	4.391e-01	-0.312	0.754961	
factor(pdays)99	-5.840e-01	5.256e-01	-1.111	0.266529	
factor(pdays)100	-3.874e-02	5.481e-01	-0.071	0.943655	
factor(pdays)101	1.180e-02	5.424e-01	0.022	0.982638	
factor(pdays)102	-1.042e+00	7.302e-01	-1.427	0.153600	
factor(pdays)103	-6.873e-01	7.410e-01	-0.928	0.353654	
factor(pdays)104	-8.790e-01	5.993e-01	-1.467	0.142425	
factor(pdays)105	-1.267e+00	7.259e-01	-1.746	0.080849	.
factor(pdays)106	-1.483e+01	4.982e+02	-0.030	0.976256	
factor(pdays)107	-7.314e-01	1.043e+00	-0.701	0.483333	
factor(pdays)108	-1.465e+01	6.815e+02	-0.021	0.982852	
factor(pdays)109	6.556e-01	5.224e-01	1.255	0.209500	
factor(pdays)110	-4.150e-01	6.171e-01	-0.672	0.501289	
factor(pdays)111	2.493e-03	5.432e-01	0.005	0.996338	
factor(pdays)112	-3.773e-01	7.554e-01	-0.499	0.617455	
factor(pdays)113	5.855e-01	4.118e-01	1.422	0.155100	
factor(pdays)114	-6.522e-01	1.047e+00	-0.623	0.533472	
factor(pdays)115	7.772e-01	6.753e-01	1.151	0.249736	
factor(pdays)116	1.040e+00	6.178e-01	1.684	0.092168	.
factor(pdays)117	1.195e+00	5.648e-01	2.115	0.034392	*
factor(pdays)118	-1.205e-01	1.073e+00	-0.112	0.910568	
factor(pdays)119	3.404e-01	4.586e-01	0.742	0.457946	
factor(pdays)120	-4.792e-01	7.481e-01	-0.641	0.521821	
factor(pdays)121	-1.473e+01	7.970e+02	-0.018	0.985254	

```

factor(pdays)122    1.441e+00  5.915e-01  2.437 0.014819 *
factor(pdays)123    8.106e-01  5.450e-01  1.487 0.136904
factor(pdays)124   -3.681e-01  7.545e-01  -0.488 0.625620
factor(pdays)125   -1.234e-01  1.085e+00  -0.114 0.909428
factor(pdays)126    7.228e-01  4.812e-01  1.502 0.133066
factor(pdays)127    1.494e-01  5.553e-01  0.269 0.787944
factor(pdays)128    8.940e-01  8.466e-01  1.056 0.290969
factor(pdays)129    6.112e-01  6.720e-01  0.909 0.363105
factor(pdays)130   -1.490e+01  6.615e+02  -0.023 0.982030
factor(pdays)131   -1.492e+01  5.621e+02  -0.027 0.978826
factor(pdays)132    1.207e+00  9.056e-01  1.333 0.182615
factor(pdays)133    1.086e+00  4.446e-01  2.444 0.014529 *
factor(pdays)134    3.921e-01  7.934e-01  0.494 0.621121
factor(pdays)135    4.031e-01  6.564e-01  0.614 0.539133
factor(pdays)136    3.391e-01  6.519e-01  0.520 0.602872
factor(pdays)137   -9.181e-02  1.072e+00  -0.086 0.931766
factor(pdays)138   -3.629e-01  1.064e+00  -0.341 0.732980
factor(pdays)139    9.537e-01  6.877e-01  1.387 0.165519
factor(pdays)140   -4.835e-01  7.520e-01  -0.643 0.520279
factor(pdays)141    2.678e-01  7.809e-01  0.343 0.731629
factor(pdays)142    1.540e+00  8.177e-01  1.884 0.059603 .
factor(pdays)143    6.321e-02  1.098e+00  0.058 0.954107
factor(pdays)144    5.652e-01  8.117e-01  0.696 0.486191
factor(pdays)145    7.958e-01  6.848e-01  1.162 0.245143
factor(pdays)146   -4.084e-02  7.629e-01  -0.054 0.957311
factor(pdays)147    1.256e-01  5.543e-01  0.227 0.820693
factor(pdays)148    5.194e-01  4.383e-01  1.185 0.236004
factor(pdays)149    9.507e-01  4.929e-01  1.929 0.053782 .
factor(pdays)150    1.561e-01  3.939e-01  0.396 0.692000
factor(pdays)151    6.222e-01  5.262e-01  1.183 0.236974
factor(pdays)152    6.285e-01  4.753e-01  1.322 0.186071
factor(pdays)153   -1.098e+00  1.033e+00  -1.063 0.287804
[ reached getOption("max.print") -- omitted 410 rows ]
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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(Dispersion parameter for binomial family taken to be 1)

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Null deviance: 39790  on 45210  degrees of freedom
Residual deviance: 38262  on 44601  degrees of freedom
AIC: 39482

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Number of Fisher Scoring iterations: 15

```

> exp(coef(logit1))
(Intercept)    factor(housing)1    factor(default)1    factor(campaign)2
2.130627e-01    1.204596e+00    2.555420e+00    9.440677e-01
factor(campaign)3    factor(campaign)4    factor(campaign)5    factor(campaign)6
9.891943e-01    9.574079e-01    9.440755e-01    9.701734e-01
factor(campaign)7    factor(campaign)8    factor(campaign)9    factor(campaign)10
9.947032e-01    9.125880e-01    7.752496e-01    1.219483e+00
factor(campaign)11    factor(campaign)12    factor(campaign)13    factor(campaign)14
9.730070e-01    7.895965e-01    1.054703e+00    5.696166e-01
factor(campaign)15    factor(campaign)16    factor(campaign)17    factor(campaign)18
1.117902e+00    1.548232e+00    7.012309e-01    1.027492e+00
factor(campaign)19    factor(campaign)20    factor(campaign)21    factor(campaign)22
1.087824e+00    1.295441e+00    9.828093e-01    1.147096e+00
factor(campaign)23    factor(campaign)24    factor(campaign)25    factor(campaign)26
4.503552e-01    1.466708e+00    1.388084e+00    8.105486e-01
factor(campaign)27    factor(campaign)28    factor(campaign)29    factor(campaign)30
3.404499e+00    9.760393e-01    3.694435e+00    2.927602e+00
factor(campaign)31    factor(campaign)32    factor(campaign)33    factor(campaign)34
1.562760e+00    1.301739e+00    2.333260e+00    1.146206e+00
factor(campaign)35    factor(campaign)36    factor(campaign)37    factor(campaign)38
3.278157e-07    4.282713e+00    3.191956e-07    2.667851e-07
factor(campaign)39    factor(campaign)41    factor(campaign)43    factor(campaign)44
2.498141e-07    2.898754e-07    1.920052e+00    2.639796e-07
factor(campaign)46    factor(campaign)50    factor(campaign)51    factor(campaign)55
2.604155e-07    4.153255e+00    2.650664e-07    2.927022e-07

```

factor(campaign)58	factor(campaign)63	factor(pdays)1	factor(pdays)2
2.540370e-07	1.012883e-06	3.550152e-01	1.359769e+00
factor(pdays)3	factor(pdays)4	factor(pdays)5	factor(pdays)6
3.204509e-07	4.018534e-07	1.143624e+00	3.217754e-07
factor(pdays)7	factor(pdays)8	factor(pdays)9	factor(pdays)10
3.448813e+00	2.032446e+00	4.350991e-01	1.115289e+00
factor(pdays)12	factor(pdays)13	factor(pdays)14	factor(pdays)15
1.861851e+00	3.238394e-07	3.196339e-07	2.900638e-07
factor(pdays)17	factor(pdays)18	factor(pdays)19	factor(pdays)20
3.041165e-07	2.888223e-07	2.707330e-07	2.850602e-07
factor(pdays)21	factor(pdays)22	factor(pdays)24	factor(pdays)25
1.623933e+00	3.070255e-07	3.172485e-07	3.380352e-07
factor(pdays)26	factor(pdays)27	factor(pdays)28	factor(pdays)29
2.775475e-07	3.848685e-07	1.548288e+00	3.061083e-07
factor(pdays)30	factor(pdays)31	factor(pdays)32	factor(pdays)33
2.645259e-07	5.104277e-07	2.952681e-07	3.394321e-07
factor(pdays)34	factor(pdays)35	factor(pdays)36	factor(pdays)37
7.219120e-07	5.110381e-07	3.651767e-07	4.794836e-07
factor(pdays)38	factor(pdays)39	factor(pdays)40	factor(pdays)41
5.057914e-07	3.066626e-07	3.327489e-07	4.500480e-07
factor(pdays)42	factor(pdays)43	factor(pdays)44	factor(pdays)45
4.601528e-07	3.486613e-07	4.910884e-07	3.502021e-07
factor(pdays)46	factor(pdays)47	factor(pdays)48	factor(pdays)49
4.751583e-07	3.074642e-07	2.289946e+00	3.374910e+00
factor(pdays)50	factor(pdays)51	factor(pdays)52	factor(pdays)53
7.334953e-01	3.460793e-07	3.620056e-07	3.208371e-07
factor(pdays)54	factor(pdays)55	factor(pdays)56	factor(pdays)57
3.715635e-07	3.398991e-07	4.433625e-07	3.924679e-07
factor(pdays)58	factor(pdays)59	factor(pdays)60	factor(pdays)61
4.197861e-07	5.010583e+00	2.511170e+00	2.713578e-07
factor(pdays)62	factor(pdays)63	factor(pdays)64	factor(pdays)65
1.327103e+00	3.858268e-07	3.299556e+00	3.315973e-07
factor(pdays)66	factor(pdays)67	factor(pdays)68	factor(pdays)69
3.060353e-07	3.235642e-07	3.125567e-07	3.891094e-07
factor(pdays)70	factor(pdays)71	factor(pdays)72	factor(pdays)73
3.757827e-07	4.623179e-07	3.811571e-07	3.511810e-07
factor(pdays)74	factor(pdays)75	factor(pdays)76	factor(pdays)77
1.144000e+00	4.348127e-07	1.224753e+00	7.690780e-01
factor(pdays)78	factor(pdays)79	factor(pdays)80	factor(pdays)81
4.019196e-07	3.685046e-01	3.682614e-07	1.280579e+00
factor(pdays)82	factor(pdays)83	factor(pdays)84	factor(pdays)85
5.617312e-01	3.068608e-01	2.459457e-01	9.721677e-01
factor(pdays)86	factor(pdays)87	factor(pdays)88	factor(pdays)89
2.365965e-01	1.441230e-01	3.634349e-07	3.895663e-01
factor(pdays)90	factor(pdays)91	factor(pdays)92	factor(pdays)93
1.089061e-01	2.935178e-01	2.083741e-01	4.817698e-01
factor(pdays)94	factor(pdays)95	factor(pdays)96	factor(pdays)97
1.624812e-01	2.600422e-01	1.229098e+00	5.581661e-01
factor(pdays)98	factor(pdays)99	factor(pdays)100	factor(pdays)101
8.719209e-01	5.576383e-01	9.620021e-01	1.011874e+00
factor(pdays)102	factor(pdays)103	factor(pdays)104	factor(pdays)105
3.527654e-01	5.029386e-01	4.151921e-01	2.816225e-01
factor(pdays)106	factor(pdays)107	factor(pdays)108	factor(pdays)109
3.634052e-07	4.812194e-01	4.350514e-07	1.926329e+00
factor(pdays)110	factor(pdays)111	factor(pdays)112	factor(pdays)113
6.603584e-01	1.002496e+00	6.857071e-01	1.795812e+00
factor(pdays)114	factor(pdays)115	factor(pdays)116	factor(pdays)117
5.209144e-01	2.175420e+00	2.830234e+00	3.303082e+00
factor(pdays)118	factor(pdays)119	factor(pdays)120	factor(pdays)121
8.864806e-01	1.405541e+00	6.192681e-01	4.002317e-07
factor(pdays)122	factor(pdays)123	factor(pdays)124	factor(pdays)125
4.226735e+00	2.249256e+00	6.920209e-01	8.838714e-01
factor(pdays)126	factor(pdays)127	factor(pdays)128	factor(pdays)129
2.060152e+00	1.161106e+00	2.444871e+00	1.842649e+00
factor(pdays)130	factor(pdays)131	factor(pdays)132	factor(pdays)133
3.381431e-07	3.315787e-07	3.343327e+00	2.963826e+00
factor(pdays)134	factor(pdays)135	factor(pdays)136	factor(pdays)137
1.480120e+00	1.496446e+00	1.403746e+00	9.122798e-01

factor(pdays)138	factor(pdays)139	factor(pdays)140	factor(pdays)141
6.956449e-01	2.595264e+00	6.166504e-01	1.307121e+00
factor(pdays)142	factor(pdays)143	factor(pdays)144	factor(pdays)145
4.665918e+00	1.065253e+00	1.759854e+00	2.216310e+00
factor(pdays)146	factor(pdays)147	factor(pdays)148	factor(pdays)149
9.599839e-01	1.133870e+00	1.681064e+00	2.587425e+00
factor(pdays)150	factor(pdays)151	factor(pdays)152	factor(pdays)153
1.168896e+00	1.863084e+00	1.874797e+00	3.335701e-01
factor(pdays)154	factor(pdays)155	factor(pdays)156	factor(pdays)157
9.493645e-01	2.165234e+00	5.832528e-01	3.622887e+00
factor(pdays)158	factor(pdays)159	factor(pdays)160	factor(pdays)161
1.605099e+00	4.310125e-07	4.169290e-01	1.449648e+00
factor(pdays)162	factor(pdays)163	factor(pdays)164	factor(pdays)165
5.876643e+00	5.210873e-01	3.049582e-01	1.460037e+00
factor(pdays)166	factor(pdays)167	factor(pdays)168	factor(pdays)169
1.662501e+00	2.413334e+00	1.012250e+00	8.443079e-01
factor(pdays)170	factor(pdays)171	factor(pdays)172	factor(pdays)173
2.468643e-01	7.176606e-01	1.953071e+00	6.919120e-01
factor(pdays)174	factor(pdays)175	factor(pdays)176	factor(pdays)177
3.431302e-01	7.720560e-01	1.259537e+00	1.834157e+00
factor(pdays)178	factor(pdays)179	factor(pdays)180	factor(pdays)181
8.312514e-01	9.383400e-01	9.632803e-01	3.121136e-01
factor(pdays)182	factor(pdays)183	factor(pdays)184	factor(pdays)185
6.579115e-01	6.781863e-01	8.229859e-01	6.772866e-01
factor(pdays)186	factor(pdays)187	factor(pdays)188	factor(pdays)189
4.127581e-01	7.116976e-01	1.166672e+00	6.352221e-01
factor(pdays)190	factor(pdays)191	factor(pdays)192	factor(pdays)193
8.652914e-01	6.756373e-01	1.676189e+00	1.568469e+00
factor(pdays)194	factor(pdays)195	factor(pdays)196	factor(pdays)197
3.871139e-07	9.743636e-01	1.643709e+00	9.256008e-01
factor(pdays)198	factor(pdays)199	factor(pdays)200	factor(pdays)201
2.187993e+00	1.303467e+00	3.236903e-01	4.329476e-01
factor(pdays)202	factor(pdays)203	factor(pdays)204	factor(pdays)205
7.452089e-01	1.205219e+00	1.803056e+00	5.215688e+00
factor(pdays)206	factor(pdays)207	factor(pdays)208	factor(pdays)209
1.839247e+00	3.008328e-07	2.219755e+00	1.790595e+00
factor(pdays)210	factor(pdays)211	factor(pdays)212	factor(pdays)213
1.211288e+00	3.553776e-07	1.242768e+00	3.101684e+00
factor(pdays)214	factor(pdays)215	factor(pdays)216	factor(pdays)217
1.830352e+01	1.566451e+00	7.076433e-01	1.186141e+00
factor(pdays)218	factor(pdays)219	factor(pdays)220	factor(pdays)221
4.177018e-07	3.165332e+00	5.846273e+00	5.167160e+00
factor(pdays)222	factor(pdays)223	factor(pdays)224	factor(pdays)225
4.865392e+00	2.349773e+00	7.688001e-01	2.255545e+00
factor(pdays)226	factor(pdays)227	factor(pdays)228	factor(pdays)229
2.968278e-07	6.733405e-01	3.432477e-07	2.726659e+00
factor(pdays)230	factor(pdays)231	factor(pdays)232	factor(pdays)233
3.821525e-07	5.276213e-01	1.441050e+00	1.338107e+00
factor(pdays)234	factor(pdays)235	factor(pdays)236	factor(pdays)237
2.047359e+00	3.337601e-07	1.357910e+00	2.065422e+00
factor(pdays)238	factor(pdays)239	factor(pdays)240	factor(pdays)241
9.629410e-01	3.174142e+00	1.391651e+00	7.434268e-01
factor(pdays)242	factor(pdays)243	factor(pdays)244	factor(pdays)245
4.304499e-07	2.972871e+00	1.957343e+00	1.572754e+00
factor(pdays)246	factor(pdays)247	factor(pdays)248	factor(pdays)249
2.134472e+00	1.715475e+00	7.615718e-01	7.419070e-01
factor(pdays)250	factor(pdays)251	factor(pdays)252	factor(pdays)253
3.280186e+00	1.391763e+00	2.041171e+00	1.641444e+00
factor(pdays)254	factor(pdays)255	factor(pdays)256	factor(pdays)257
1.131505e+00	9.846641e-01	9.902354e-01	1.419003e+00
factor(pdays)258	factor(pdays)259	factor(pdays)260	factor(pdays)261
7.024865e-01	9.617128e-01	4.699441e-01	7.874333e-01
factor(pdays)262	factor(pdays)263	factor(pdays)264	factor(pdays)265
1.600983e+00	7.833195e-01	3.263958e-01	7.694043e-01
factor(pdays)266	factor(pdays)267	factor(pdays)268	factor(pdays)269
4.994597e-01	1.940883e-01	1.225347e+00	5.800191e-01
factor(pdays)270	factor(pdays)271	factor(pdays)272	factor(pdays)273
5.475734e-01	3.739451e-01	7.278620e-01	1.598727e+00

factor(pdays)274	factor(pdays)275	factor(pdays)276	factor(pdays)277
1.332304e+00	7.036856e-01	3.802281e-01	6.731171e-01
factor(pdays)278	factor(pdays)279	factor(pdays)280	factor(pdays)281
1.709486e+00	3.583919e-07	1.309256e+00	1.612010e+00
factor(pdays)282	factor(pdays)283	factor(pdays)284	factor(pdays)285
1.174057e+00	1.153249e+00	1.932419e+00	1.216149e+00
factor(pdays)286	factor(pdays)287	factor(pdays)288	factor(pdays)289
8.754507e-01	9.272532e-01	9.892347e-01	1.631966e+00
factor(pdays)290	factor(pdays)291	factor(pdays)292	factor(pdays)293
1.100757e+00	5.851691e-01	5.143460e-01	5.435547e-01
factor(pdays)294	factor(pdays)295	factor(pdays)296	factor(pdays)297
1.267629e+00	1.713830e+00	1.045802e+00	3.112822e-01
factor(pdays)298	factor(pdays)299	factor(pdays)300	factor(pdays)301
2.352054e-01	7.711650e-01	9.847670e-01	4.686276e-01
factor(pdays)302	factor(pdays)303	factor(pdays)304	factor(pdays)305
9.864041e-01	3.959840e-01	1.388514e+00	1.762012e+00
factor(pdays)306	factor(pdays)307	factor(pdays)308	factor(pdays)309
2.013822e+00	2.403649e+00	1.017238e+00	2.874133e+00
factor(pdays)310	factor(pdays)311	factor(pdays)312	factor(pdays)313
7.605315e-01	2.651545e+00	1.567409e+00	1.884983e+00
factor(pdays)314	factor(pdays)315	factor(pdays)316	factor(pdays)317
1.880560e+00	4.354094e-01	7.053266e-01	6.392088e-01
factor(pdays)318	factor(pdays)319	factor(pdays)320	factor(pdays)321
1.069565e+00	1.525571e+00	6.792413e-01	6.779748e-01
factor(pdays)322	factor(pdays)323	factor(pdays)324	factor(pdays)325
5.412010e-01	4.217102e-01	3.255358e-01	1.690899e+00
factor(pdays)326	factor(pdays)327	factor(pdays)328	factor(pdays)329
9.125634e-01	4.128697e-01	3.185356e-07	1.612516e+00
factor(pdays)330	factor(pdays)331	factor(pdays)332	factor(pdays)333
8.208855e-01	5.143993e-01	8.647204e-01	1.054196e+00
factor(pdays)334	factor(pdays)335	factor(pdays)336	factor(pdays)337
4.952987e-01	1.079669e+00	2.624818e-01	9.000600e-01
factor(pdays)338	factor(pdays)339	factor(pdays)340	factor(pdays)341
7.060472e-01	1.119665e+00	3.535590e-01	1.346204e+00
factor(pdays)342	factor(pdays)343	factor(pdays)344	factor(pdays)345
1.002926e-01	1.399684e+00	6.939780e-01	3.849407e-01
factor(pdays)346	factor(pdays)347	factor(pdays)348	factor(pdays)349
9.136994e-01	7.812077e-01	2.841902e-07	1.161279e+00
factor(pdays)350	factor(pdays)351	factor(pdays)352	factor(pdays)353
1.205020e+00	1.213800e+00	1.164386e+00	1.880223e+00
factor(pdays)354	factor(pdays)355	factor(pdays)356	factor(pdays)357
2.970019e-07	6.804640e-01	8.369206e-01	7.824430e-01
factor(pdays)358	factor(pdays)359	factor(pdays)360	factor(pdays)361
5.969601e-01	5.319993e-01	2.455667e-01	1.003009e+00
factor(pdays)362	factor(pdays)363	factor(pdays)364	factor(pdays)365
6.957242e-01	9.999542e-01	4.376652e-01	1.755060e-01
factor(pdays)366	factor(pdays)367	factor(pdays)368	factor(pdays)369
6.848311e-01	3.048132e-01	1.915756e-01	9.587565e-01
factor(pdays)370	factor(pdays)371	factor(pdays)372	factor(pdays)373
4.820756e-01	3.245889e-01	3.558912e-07	1.275831e+00
factor(pdays)374	factor(pdays)375	factor(pdays)376	factor(pdays)377
4.290778e-01	3.219803e-07	5.370172e-07	4.580901e-07
factor(pdays)378	factor(pdays)379	factor(pdays)380	factor(pdays)381
1.283060e+00	4.032371e-07	2.545581e-07	3.621502e-07
factor(pdays)382	factor(pdays)383	factor(pdays)384	factor(pdays)385
2.733533e-07	4.059719e-07	1.777158e+00	4.667236e-07
factor(pdays)386	factor(pdays)387	factor(pdays)388	factor(pdays)389
1.090242e+00	5.806552e+00	5.431409e-07	3.995582e-07
factor(pdays)390	factor(pdays)391	factor(pdays)392	factor(pdays)393
3.438507e-07	6.722453e-01	3.502817e-07	4.799288e-07
factor(pdays)394	factor(pdays)395	factor(pdays)396	factor(pdays)397
3.075135e+00	4.000973e-07	3.858305e-07	4.471898e-07
factor(pdays)398	factor(pdays)399	factor(pdays)401	factor(pdays)403
4.084721e-07	1.248045e-06	2.661134e-07	3.592007e-07
factor(pdays)404	factor(pdays)405	factor(pdays)407	factor(pdays)409
3.379602e-07	1.806202e-06	1.308885e+08	4.858095e-07
factor(pdays)410	factor(pdays)411	factor(pdays)412	factor(pdays)413
3.775502e-07	2.600359e-07	4.366446e-07	3.552873e-07

factor(pdays)414 3.754344e-07	factor(pdays)415 3.416458e-07	factor(pdays)416 6.504627e+07	factor(pdays)417 6.145485e+07
factor(pdays)419 3.409154e-07	factor(pdays)420 3.325711e-07	factor(pdays)421 3.407883e-07	factor(pdays)422 2.856077e-07
factor(pdays)424 2.520026e-07	factor(pdays)425 3.209369e-07	factor(pdays)426 2.626637e-07	factor(pdays)427 2.654011e-07
factor(pdays)428 2.590890e-07	factor(pdays)430 1.604631e+00	factor(pdays)431 3.040593e-07	factor(pdays)432 1.022080e+08
factor(pdays)433 3.976993e-07	factor(pdays)434 2.865666e-07	factor(pdays)435 2.838942e-07	factor(pdays)436 2.898040e-07
factor(pdays)437 5.168213e-07	factor(pdays)439 6.232231e-07	factor(pdays)440 8.460732e-07	factor(pdays)442 4.579717e-07
factor(pdays)444 4.469663e-07	factor(pdays)445 5.127600e-07	factor(pdays)446 3.408566e-07	factor(pdays)449 3.847592e-07
factor(pdays)450 3.816283e-07	factor(pdays)452 2.868248e-07	factor(pdays)454 3.100073e-07	factor(pdays)455 4.106486e-07
factor(pdays)456 5.506464e-07	factor(pdays)457 2.873337e-07	factor(pdays)458 3.951806e-07	factor(pdays)459 3.580668e-07
factor(pdays)460 3.668816e-07	factor(pdays)461 3.034884e+00	factor(pdays)462 1.932440e+00	factor(pdays)463 1.627802e+00
factor(pdays)464 3.375898e-07	factor(pdays)465 4.420748e-07	factor(pdays)466 5.725467e-07	factor(pdays)467 7.077472e-07
factor(pdays)469 7.045326e-07	factor(pdays)470 2.546777e-07	factor(pdays)472 3.281797e-07	factor(pdays)474 3.406224e-07
factor(pdays)475 2.590038e-07	factor(pdays)476 2.748467e-07	factor(pdays)477 2.966158e-07	factor(pdays)478 2.887024e-07
factor(pdays)479 3.209088e-07	factor(pdays)480 2.057007e-06	factor(pdays)481 3.922076e-07	factor(pdays)484 4.774161e-07
factor(pdays)485 4.277611e-07	factor(pdays)486 3.126798e-07	factor(pdays)489 3.946800e-07	factor(pdays)490 3.300640e-07
factor(pdays)491 3.535087e-07	factor(pdays)492 2.892735e-07	factor(pdays)493 7.989713e-07	factor(pdays)495 2.821742e-07
factor(pdays)500 5.407147e-07	factor(pdays)503 2.920484e-07	factor(pdays)504 3.941142e-07	factor(pdays)508 9.123379e-07
factor(pdays)511 2.632107e-06	factor(pdays)514 3.001893e-07	factor(pdays)515 4.786499e+00	factor(pdays)518 1.122996e-06
factor(pdays)520 2.768592e-07	factor(pdays)521 1.197667e+00	factor(pdays)524 3.079424e-07	factor(pdays)526 3.307334e-07
factor(pdays)528 3.180967e-07	factor(pdays)529 3.279352e-07	factor(pdays)530 3.495935e-07	factor(pdays)531 2.718033e-07
factor(pdays)532 3.770556e-07	factor(pdays)535 4.754155e-07	factor(pdays)536 7.299724e-07	factor(pdays)541 3.551285e-07
factor(pdays)542 2.898796e-07	factor(pdays)543 2.730096e-07	factor(pdays)544 7.816557e-07	factor(pdays)547 3.142648e-07
factor(pdays)550 2.831494e-07	factor(pdays)551 1.726748e-06	factor(pdays)553 8.682993e+07	factor(pdays)555 2.898022e-07
factor(pdays)557 3.355371e-07	factor(pdays)558 2.857390e-07	factor(pdays)561 3.480834e-07	factor(pdays)562 3.179802e-07
factor(pdays)578 4.191564e-07	factor(pdays)579 3.030209e-07	factor(pdays)585 5.080356e-07	factor(pdays)586 3.074106e-07
factor(pdays)587 3.340879e-07	factor(pdays)589 1.435394e-05	factor(pdays)592 2.533096e-07	factor(pdays)594 7.788970e+07
factor(pdays)595 3.369470e-07	factor(pdays)603 3.661133e-07	factor(pdays)616 3.765288e-07	factor(pdays)626 3.608108e-07
factor(pdays)633 4.991660e-07	factor(pdays)648 3.352175e-07	factor(pdays)651 2.913717e-07	factor(pdays)655 3.092566e-07
factor(pdays)656 2.593966e-07	factor(pdays)667 3.082574e-07	factor(pdays)670 7.279482e+07	factor(pdays)674 3.094342e-07
factor(pdays)680 3.201832e-07	factor(pdays)683 3.402590e-07	factor(pdays)686 7.479839e+07	factor(pdays)687 7.427233e+07
factor(pdays)690 4.550397e-07	factor(pdays)701 2.517478e-07	factor(pdays)717 3.601490e-07	factor(pdays)728 3.935886e-07
factor(pdays)745 2.525918e-07	factor(pdays)749 1.036688e+08	factor(pdays)756 3.372738e-07	factor(pdays)760 3.861725e-07
factor(pdays)761 4.945938e-07	factor(pdays)769 3.934947e-07	factor(pdays)771 3.563913e-07	factor(pdays)772 3.158738e-07
factor(pdays)774 9.139749e+07	factor(pdays)775 2.538481e-07	factor(pdays)776 2.781709e-07	factor(pdays)778 6.933168e+07

factor(pdays)779	factor(pdays)782	factor(pdays)784	factor(pdays)791
4.336977e-07	2.510587e-07	3.596216e-07	2.559658e-07
factor(pdays)792	factor(pdays)804	factor(pdays)805	factor(pdays)808
3.127367e-07	3.505009e-07	3.901749e-07	7.505646e+07
factor(pdays)826	factor(pdays)828	factor(pdays)831	factor(pdays)838
3.124370e-07	2.696629e-07	2.828570e-07	2.652087e-07
factor(pdays)842	factor(pdays)850	factor(pdays)854	factor(pdays)871
2.811201e-07	3.072180e-07	2.761448e-07	3.425049e-07
balance	duration		
9.998462e-01	9.999127e-01		

```
> library(MASS)
> library(car)
> stepAIC(fit1)
```

Start: AIC=38852.91

loan ~ housing + default + campaign + pdays + previous + y +
balance + duration

	Df	Deviance	AIC
- campaign	1	38835	38851
- previous	1	38836	38852
<none>		38835	38853
- duration	1	38846	38862
- pdays	1	38849	38865
- housing	1	38872	38888
- default	1	38979	38995
- y	1	38997	39013
- balance	1	39272	39288

Step: AIC=38851.3

loan ~ housing + default + pdays + previous + y + balance + duration

	Df	Deviance	AIC
- previous	1	38837	38851
<none>		38835	38851
- duration	1	38846	38860
- pdays	1	38850	38864
- housing	1	38872	38886
- default	1	38979	38993
- y	1	38998	39012
- balance	1	39273	39287

Step: AIC=38850.57

loan ~ housing + default + pdays + y + balance + duration

	Df	Deviance	AIC
<none>		38837	38851
- duration	1	38847	38859
- pdays	1	38850	38862
- housing	1	38873	38885
- default	1	38980	38992
- y	1	38998	39010
- balance	1	39273	39285

Call: glm(formula = loan ~ housing + default + pdays + y + balance +
duration, family = "binomial", data = bank)

Coefficients:

(Intercept)	housing	default	pdays	yyes
-1.5831429	0.1621872	0.9409942	-0.0005030	-0.6521309
balance	duration			
-0.0001504	0.0001814			

Degrees of Freedom: 45210 Total (i.e. Null); 45204 Residual

Null Deviance: 39790

Residual Deviance: 38840 AIC: 38850

```
> logit1 <- glm(loan~factor(housing)+factor(default)+factor(campaign)+factor(pday
s)+balance+duration,family= binomial,data=bank)
> summary(logit1)
```

Call:

```
glm(formula = loan ~ factor(housing) + factor(default) + factor(campaign) +
  factor(pdays) + balance + duration, family = binomial, data = bank)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-1.7892	-0.6346	-0.5836	-0.3976	4.3563

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-1.546e+00	3.162e-02	-48.894	< 2e-16	***
factor(housing)1	1.861e-01	2.718e-02	6.848	7.49e-12	***
factor(default)1	9.382e-01	7.508e-02	12.497	< 2e-16	***
factor(campaign)2	-5.756e-02	3.276e-02	-1.757	0.078954	.
factor(campaign)3	-1.086e-02	4.274e-02	-0.254	0.799324	
factor(campaign)4	-4.353e-02	5.132e-02	-0.848	0.396405	
factor(campaign)5	-5.755e-02	6.923e-02	-0.831	0.405816	
factor(campaign)6	-3.028e-02	8.003e-02	-0.378	0.705159	
factor(campaign)7	-5.311e-03	1.037e-01	-0.051	0.959140	
factor(campaign)8	-9.147e-02	1.223e-01	-0.748	0.454461	
factor(campaign)9	-2.546e-01	1.657e-01	-1.536	0.124558	
factor(campaign)10	1.984e-01	1.570e-01	1.264	0.206243	
factor(campaign)11	-2.736e-02	1.918e-01	-0.143	0.886567	
factor(campaign)12	-2.362e-01	2.368e-01	-0.998	0.318472	
factor(campaign)13	5.326e-02	2.286e-01	0.233	0.815762	
factor(campaign)14	-5.628e-01	3.386e-01	-1.662	0.096523	.
factor(campaign)15	1.115e-01	2.800e-01	0.398	0.690642	
factor(campaign)16	4.371e-01	2.631e-01	1.662	0.096585	.
factor(campaign)17	-3.549e-01	3.617e-01	-0.981	0.326472	
factor(campaign)18	2.712e-02	3.717e-01	0.073	0.941838	
factor(campaign)19	8.418e-02	3.945e-01	0.213	0.831030	
factor(campaign)20	2.589e-01	3.817e-01	0.678	0.497729	
factor(campaign)21	-1.734e-02	4.524e-01	-0.038	0.969423	
factor(campaign)22	1.372e-01	5.125e-01	0.268	0.788860	
factor(campaign)23	-7.977e-01	7.482e-01	-1.066	0.286365	
factor(campaign)24	3.830e-01	5.178e-01	0.740	0.459485	
factor(campaign)25	3.279e-01	5.263e-01	0.623	0.533250	
factor(campaign)26	-2.100e-01	7.697e-01	-0.273	0.784933	
factor(campaign)27	1.225e+00	6.533e-01	1.875	0.060756	.
factor(campaign)28	-2.425e-02	6.454e-01	-0.038	0.970024	
factor(campaign)29	1.307e+00	5.094e-01	2.566	0.010298	*
factor(campaign)30	1.074e+00	7.361e-01	1.459	0.144479	
factor(campaign)31	4.465e-01	6.778e-01	0.659	0.510117	
factor(campaign)32	2.637e-01	8.032e-01	0.328	0.742673	
factor(campaign)33	8.473e-01	8.685e-01	0.975	0.329313	
factor(campaign)34	1.365e-01	1.119e+00	0.122	0.902954	
factor(campaign)35	-1.493e+01	1.191e+03	-0.013	0.989995	
factor(campaign)36	1.455e+00	1.035e+00	1.405	0.160035	
factor(campaign)37	-1.496e+01	1.693e+03	-0.009	0.992950	
factor(campaign)38	-1.514e+01	1.384e+03	-0.011	0.991276	
factor(campaign)39	-1.520e+01	2.400e+03	-0.006	0.994945	
factor(campaign)41	-1.505e+01	1.694e+03	-0.009	0.992911	
factor(campaign)43	6.524e-01	1.225e+00	0.532	0.594411	
factor(campaign)44	-1.515e+01	2.400e+03	-0.006	0.994963	
factor(campaign)46	-1.516e+01	2.400e+03	-0.006	0.994959	
factor(campaign)50	1.424e+00	1.414e+00	1.007	0.314107	
factor(campaign)51	-1.514e+01	2.400e+03	-0.006	0.994965	
factor(campaign)55	-1.504e+01	2.400e+03	-0.006	0.994998	
factor(campaign)58	-1.519e+01	2.400e+03	-0.006	0.994951	
factor(campaign)63	-1.380e+01	2.400e+03	-0.006	0.995410	
factor(pdays)1	-1.036e+00	1.036e+00	-1.000	0.317495	

factor(pdays)2	3.073e-01	4.009e-01	0.767	0.443287
factor(pdays)3	-1.495e+01	2.400e+03	-0.006	0.995028
factor(pdays)4	-1.473e+01	1.694e+03	-0.009	0.993065
factor(pdays)5	1.342e-01	7.835e-01	0.171	0.864000
factor(pdays)6	-1.495e+01	7.583e+02	-0.020	0.984271
factor(pdays)7	1.238e+00	7.699e-01	1.608	0.107837
factor(pdays)8	7.092e-01	4.487e-01	1.581	0.113991
factor(pdays)9	-8.322e-01	1.045e+00	-0.796	0.425931
factor(pdays)10	1.091e-01	1.101e+00	0.099	0.921081
factor(pdays)12	6.216e-01	8.380e-01	0.742	0.458247
factor(pdays)13	-1.494e+01	9.759e+02	-0.015	0.987784
factor(pdays)14	-1.496e+01	7.993e+02	-0.019	0.985070
factor(pdays)15	-1.505e+01	1.382e+03	-0.011	0.991308
factor(pdays)17	-1.501e+01	1.199e+03	-0.013	0.990014
factor(pdays)18	-1.506e+01	2.400e+03	-0.006	0.994993
factor(pdays)19	-1.512e+01	1.697e+03	-0.009	0.992889
factor(pdays)20	-1.507e+01	1.696e+03	-0.009	0.992912
factor(pdays)21	4.849e-01	1.156e+00	0.419	0.674926
factor(pdays)22	-1.500e+01	1.382e+03	-0.011	0.991341
factor(pdays)24	-1.496e+01	1.692e+03	-0.009	0.992944
factor(pdays)25	-1.490e+01	2.400e+03	-0.006	0.995046
factor(pdays)26	-1.510e+01	2.400e+03	-0.006	0.994980
factor(pdays)27	-1.477e+01	1.193e+03	-0.012	0.990122
factor(pdays)28	4.371e-01	8.079e-01	0.541	0.588439
factor(pdays)29	-1.500e+01	1.383e+03	-0.011	0.991344
factor(pdays)30	-1.515e+01	2.400e+03	-0.006	0.994964
factor(pdays)31	-1.449e+01	1.004e+03	-0.014	0.988490
factor(pdays)32	-1.504e+01	2.400e+03	-0.006	0.995001
factor(pdays)33	-1.490e+01	1.697e+03	-0.009	0.992995
factor(pdays)34	-1.414e+01	1.632e+03	-0.009	0.993087
factor(pdays)35	-1.449e+01	8.117e+02	-0.018	0.985761
factor(pdays)36	-1.482e+01	1.186e+03	-0.013	0.990026
factor(pdays)37	-1.455e+01	1.188e+03	-0.012	0.990230
factor(pdays)38	-1.450e+01	1.383e+03	-0.010	0.991636
factor(pdays)39	-1.500e+01	1.696e+03	-0.009	0.992944
factor(pdays)40	-1.492e+01	9.045e+02	-0.016	0.986843
factor(pdays)41	-1.461e+01	1.069e+03	-0.014	0.989095
factor(pdays)42	-1.459e+01	1.301e+03	-0.011	0.991055
factor(pdays)43	-1.487e+01	1.686e+03	-0.009	0.992963
factor(pdays)44	-1.453e+01	1.372e+03	-0.011	0.991551
factor(pdays)45	-1.486e+01	2.400e+03	-0.006	0.995057
factor(pdays)46	-1.456e+01	1.663e+03	-0.009	0.993016
factor(pdays)47	-1.499e+01	2.400e+03	-0.006	0.995014
factor(pdays)48	8.285e-01	1.164e+00	0.712	0.476572
factor(pdays)49	1.216e+00	1.266e+00	0.961	0.336746
factor(pdays)50	-3.099e-01	1.071e+00	-0.289	0.772365
factor(pdays)51	-1.488e+01	2.400e+03	-0.006	0.995053
factor(pdays)52	-1.483e+01	1.694e+03	-0.009	0.993015
factor(pdays)53	-1.495e+01	1.384e+03	-0.011	0.991377
factor(pdays)54	-1.481e+01	2.400e+03	-0.006	0.995077
factor(pdays)55	-1.489e+01	1.188e+03	-0.013	0.989993
factor(pdays)56	-1.463e+01	1.061e+03	-0.014	0.989003
factor(pdays)57	-1.475e+01	8.401e+02	-0.018	0.985991
factor(pdays)58	-1.468e+01	1.373e+03	-0.011	0.991469
factor(pdays)59	1.612e+00	1.415e+00	1.139	0.254578
factor(pdays)60	9.207e-01	8.483e-01	1.085	0.277716
factor(pdays)61	-1.512e+01	1.199e+03	-0.013	0.989938
factor(pdays)62	2.830e-01	1.130e+00	0.250	0.802309
factor(pdays)63	-1.477e+01	7.934e+02	-0.019	0.985149
factor(pdays)64	1.194e+00	7.452e-01	1.602	0.109162
factor(pdays)65	-1.492e+01	2.400e+03	-0.006	0.995039
factor(pdays)66	-1.500e+01	1.383e+03	-0.011	0.991346
factor(pdays)67	-1.494e+01	9.783e+02	-0.015	0.987812
factor(pdays)68	-1.498e+01	1.198e+03	-0.013	0.990026
factor(pdays)69	-1.476e+01	1.182e+03	-0.012	0.990039
factor(pdays)70	-1.479e+01	8.926e+02	-0.017	0.986776

factor(pdays)71	-1.459e+01	9.163e+02	-0.016	0.987299	
factor(pdays)72	-1.478e+01	1.689e+03	-0.009	0.993017	
factor(pdays)73	-1.486e+01	1.068e+03	-0.014	0.988902	
factor(pdays)74	1.345e-01	1.092e+00	0.123	0.901976	
factor(pdays)75	-1.465e+01	8.971e+02	-0.016	0.986973	
factor(pdays)76	2.027e-01	1.120e+00	0.181	0.856295	
factor(pdays)77	-2.626e-01	1.063e+00	-0.247	0.804894	
factor(pdays)78	-1.473e+01	6.321e+02	-0.023	0.981412	
factor(pdays)79	-9.983e-01	1.037e+00	-0.962	0.335912	
factor(pdays)80	-1.481e+01	5.637e+02	-0.026	0.979033	
factor(pdays)81	2.473e-01	7.894e-01	0.313	0.754069	
factor(pdays)82	-5.767e-01	1.052e+00	-0.548	0.583455	
factor(pdays)83	-1.181e+00	1.028e+00	-1.149	0.250539	
factor(pdays)84	-1.403e+00	1.022e+00	-1.373	0.169889	
factor(pdays)85	-2.823e-02	4.909e-01	-0.057	0.954147	
factor(pdays)86	-1.441e+00	1.021e+00	-1.412	0.158059	
factor(pdays)87	-1.937e+00	1.013e+00	-1.911	0.055948	.
factor(pdays)88	-1.483e+01	4.435e+02	-0.033	0.973329	
factor(pdays)89	-9.427e-01	7.339e-01	-1.285	0.198964	
factor(pdays)90	-2.217e+00	1.010e+00	-2.195	0.028199	*
factor(pdays)91	-1.226e+00	4.195e-01	-2.922	0.003477	**
factor(pdays)92	-1.568e+00	4.561e-01	-3.438	0.000585	***
factor(pdays)93	-7.303e-01	4.671e-01	-1.563	0.117968	
factor(pdays)94	-1.817e+00	7.180e-01	-2.531	0.011377	*
factor(pdays)95	-1.347e+00	5.907e-01	-2.280	0.022602	*
factor(pdays)96	2.063e-01	3.527e-01	0.585	0.558656	
factor(pdays)97	-5.831e-01	5.230e-01	-1.115	0.264857	
factor(pdays)98	-1.371e-01	4.391e-01	-0.312	0.754961	
factor(pdays)99	-5.840e-01	5.256e-01	-1.111	0.266529	
factor(pdays)100	-3.874e-02	5.481e-01	-0.071	0.943655	
factor(pdays)101	1.180e-02	5.424e-01	0.022	0.982638	
factor(pdays)102	-1.042e+00	7.302e-01	-1.427	0.153600	
factor(pdays)103	-6.873e-01	7.410e-01	-0.928	0.353654	
factor(pdays)104	-8.790e-01	5.993e-01	-1.467	0.142425	
factor(pdays)105	-1.267e+00	7.259e-01	-1.746	0.080849	.
factor(pdays)106	-1.483e+01	4.982e+02	-0.030	0.976256	
factor(pdays)107	-7.314e-01	1.043e+00	-0.701	0.483333	
factor(pdays)108	-1.465e+01	6.815e+02	-0.021	0.982852	
factor(pdays)109	6.556e-01	5.224e-01	1.255	0.209500	
factor(pdays)110	-4.150e-01	6.171e-01	-0.672	0.501289	
factor(pdays)111	2.493e-03	5.432e-01	0.005	0.996338	
factor(pdays)112	-3.773e-01	7.554e-01	-0.499	0.617455	
factor(pdays)113	5.855e-01	4.118e-01	1.422	0.155100	
factor(pdays)114	-6.522e-01	1.047e+00	-0.623	0.533472	
factor(pdays)115	7.772e-01	6.753e-01	1.151	0.249736	
factor(pdays)116	1.040e+00	6.178e-01	1.684	0.092168	.
factor(pdays)117	1.195e+00	5.648e-01	2.115	0.034392	*
factor(pdays)118	-1.205e-01	1.073e+00	-0.112	0.910568	
factor(pdays)119	3.404e-01	4.586e-01	0.742	0.457946	
factor(pdays)120	-4.792e-01	7.481e-01	-0.641	0.521821	
factor(pdays)121	-1.473e+01	7.970e+02	-0.018	0.985254	
factor(pdays)122	1.441e+00	5.915e-01	2.437	0.014819	*
factor(pdays)123	8.106e-01	5.450e-01	1.487	0.136904	
factor(pdays)124	-3.681e-01	7.545e-01	-0.488	0.625620	
factor(pdays)125	-1.234e-01	1.085e+00	-0.114	0.909428	
factor(pdays)126	7.228e-01	4.812e-01	1.502	0.133066	
factor(pdays)127	1.494e-01	5.553e-01	0.269	0.787944	
factor(pdays)128	8.940e-01	8.466e-01	1.056	0.290969	
factor(pdays)129	6.112e-01	6.720e-01	0.909	0.363105	
factor(pdays)130	-1.490e+01	6.615e+02	-0.023	0.982030	
factor(pdays)131	-1.492e+01	5.621e+02	-0.027	0.978826	
factor(pdays)132	1.207e+00	9.056e-01	1.333	0.182615	
factor(pdays)133	1.086e+00	4.446e-01	2.444	0.014529	*
factor(pdays)134	3.921e-01	7.934e-01	0.494	0.621121	
factor(pdays)135	4.031e-01	6.564e-01	0.614	0.539133	
factor(pdays)136	3.391e-01	6.519e-01	0.520	0.602872	

```

factor(pdays)137 -9.181e-02 1.072e+00 -0.086 0.931766
factor(pdays)138 -3.629e-01 1.064e+00 -0.341 0.732980
factor(pdays)139 9.537e-01 6.877e-01 1.387 0.165519
factor(pdays)140 -4.835e-01 7.520e-01 -0.643 0.520279
factor(pdays)141 2.678e-01 7.809e-01 0.343 0.731629
factor(pdays)142 1.540e+00 8.177e-01 1.884 0.059603 .
factor(pdays)143 6.321e-02 1.098e+00 0.058 0.954107
factor(pdays)144 5.652e-01 8.117e-01 0.696 0.486191
factor(pdays)145 7.958e-01 6.848e-01 1.162 0.245143
factor(pdays)146 -4.084e-02 7.629e-01 -0.054 0.957311
factor(pdays)147 1.256e-01 5.543e-01 0.227 0.820693
factor(pdays)148 5.194e-01 4.383e-01 1.185 0.236004
factor(pdays)149 9.507e-01 4.929e-01 1.929 0.053782 .
factor(pdays)150 1.561e-01 3.939e-01 0.396 0.692000
factor(pdays)151 6.222e-01 5.262e-01 1.183 0.236974
factor(pdays)152 6.285e-01 4.753e-01 1.322 0.186071
factor(pdays)153 -1.098e+00 1.033e+00 -1.063 0.287804
[ reached getOption("max.print") -- omitted 410 rows ]
---
signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

(Dispersion parameter for binomial family taken to be 1)

```

Null deviance: 39790 on 45210 degrees of freedom
Residual deviance: 38262 on 44601 degrees of freedom
AIC: 39482

```

Number of Fisher Scoring iterations: 15

```

> prob <- predict(logit1,type = c("response"),bank)
> prob

```

1.528390e-01	2.013845e-01	2.031107e-01	1.680160e-01	1.731305e-01	1.965980e-01
7	8	9	10	11	12
1.903507e-01	3.881069e-01	2.005270e-01	1.890709e-01	1.945146e-01	1.927900e-01
13	14	15	16	17	18
1.968555e-01	2.014681e-01	1.977950e-01	1.937130e-01	2.025267e-01	2.024033e-01
19	20	21	22	23	24
1.996686e-01	2.034715e-01	1.833036e-01	1.832941e-01	2.014066e-01	1.982032e-01
25	26	27	28	29	30
2.016812e-01	2.111843e-01	1.938652e-01	1.996485e-01	1.975009e-01	1.929174e-01
31	32	33	34	35	36
1.551344e-01	1.918162e-01	2.003391e-01	2.010497e-01	4.628438e-02	1.992744e-01
37	38	39	40	41	42
1.992801e-01	1.556321e-01	1.841881e-01	2.023001e-01	1.453126e-01	1.914170e-01
43	44	45	46	47	48
2.013392e-01	1.719864e-01	1.933246e-01	2.050811e-01	2.083331e-01	1.919767e-01
49	50	51	52	53	54
1.736278e-01	1.991361e-01	1.705322e-01	2.067606e-01	2.017093e-01	1.951306e-01
55	56	57	58	59	60
2.047557e-01	1.681579e-01	1.924244e-01	1.965122e-01	2.010313e-01	1.761396e-01
61	62	63	64	65	66
2.022860e-01	1.703647e-01	1.958171e-01	1.800972e-01	1.954667e-01	8.528463e-02
67	68	69	70	71	72
1.669178e-01	1.989411e-01	1.656520e-01	3.711180e-02	9.148384e-02	2.011888e-01
73	74	75	76	77	78
1.951559e-01	1.995742e-01	1.579141e-01	1.924043e-01	1.605524e-01	1.692959e-01
79	80	81	82	83	84
2.004056e-01	3.917140e-01	1.964612e-01	1.693978e-01	1.872578e-01	1.404652e-01
85	86	87	88	89	90
1.974086e-01	1.838673e-01	1.569482e-01	1.575422e-01	1.920957e-01	1.812262e-01
91	92	93	94	95	96
1.739266e-01	1.885353e-01	1.891538e-01	1.997882e-01	1.742828e-01	1.958024e-01
97	98	99	100	101	102
1.638113e-01	2.008002e-01	2.013722e-01	1.958482e-01	2.177621e-01	1.720972e-01
103	104	105	106	107	108

1.978634e-01	1.973043e-01	1.986217e-01	2.001233e-01	1.978420e-01	1.740220e-01
109	110	111	112	113	114
1.963137e-01	1.719121e-01	2.007323e-01	1.720896e-01	1.929660e-01	1.894008e-01
115	116	117	118	119	120
2.007162e-01	1.882699e-01	1.885850e-01	2.007711e-01	1.677007e-01	1.744055e-01
121	122	123	124	125	126
1.967155e-01	2.024714e-01	2.007164e-01	1.923250e-01	1.732857e-01	1.889878e-01
127	128	129	130	131	132
1.837419e-01	2.035310e-01	2.022156e-01	1.428902e-01	1.433718e-01	1.941107e-01
133	134	135	136	137	138
1.630907e-01	1.751299e-01	1.933340e-01	1.991956e-01	2.023142e-01	1.747198e-01
139	140	141	142	143	144
1.845766e-01	1.903085e-01	1.794694e-01	1.999266e-01	1.741286e-01	2.004443e-01
145	146	147	148	149	150
2.014355e-01	2.026836e-01	1.927073e-01	1.936744e-01	1.924334e-01	1.792187e-01
151	152	153	154	155	156
1.932727e-01	1.868188e-01	1.769977e-01	2.025857e-01	1.631384e-01	1.934838e-01
157	158	159	160	161	162
1.604745e-01	1.955998e-01	1.825274e-01	1.725254e-01	1.636004e-01	2.005195e-01
163	164	165	166	167	168
1.867752e-01	1.604697e-01	1.983215e-01	1.990030e-01	1.961776e-01	1.689655e-01
169	170	171	172	173	174
1.556752e-01	1.711688e-01	1.896665e-01	1.692969e-01	2.002169e-01	1.645188e-01
175	176	177	178	179	180
2.001233e-01	1.717803e-01	1.916211e-01	1.935530e-01	1.838505e-01	1.678116e-01
181	182	183	184	185	186
1.989242e-01	1.682240e-01	1.879955e-01	1.922817e-01	1.880416e-01	1.961153e-01
187	188	189	190	191	192
1.128454e-01	1.010055e-01	1.980744e-01	1.963810e-01	1.541681e-01	1.920160e-01
193	194	195	196	197	198
1.913588e-01	1.924241e-01	1.942222e-01	1.836547e-01	1.969426e-01	1.706062e-01
199	200	201	202	203	204
1.909413e-01	1.618620e-01	1.909157e-01	2.000375e-01	1.839044e-01	1.799406e-01
205	206	207	208	209	210
1.976373e-01	8.886016e-02	1.992852e-01	1.882426e-01	1.922945e-01	1.998227e-01
211	212	213	214	215	216
2.099764e-01	1.843419e-01	1.590028e-01	1.939321e-01	2.011938e-01	1.901561e-01
217	218	219	220	221	222
1.628014e-01	1.687079e-01	1.531531e-01	1.843994e-01	1.938989e-01	1.938564e-01
223	224	225	226	227	228
2.017184e-01	1.739285e-01	1.801405e-01	1.867510e-01	1.746059e-01	2.030060e-01
229	230	231	232	233	234
1.438808e-01	1.684649e-01	2.042811e-01	1.763927e-01	1.782989e-01	1.373099e-01
235	236	237	238	239	240
1.857229e-01	2.030465e-01	1.851496e-01	2.031181e-01	1.997023e-01	1.989951e-01
241	242	243	244	245	246
1.939099e-01	1.920614e-01	1.737405e-01	1.920093e-01	1.313410e-01	1.568784e-01
247	248	249	250	251	252
1.926001e-01	1.985669e-01	1.886288e-01	1.387454e-01	1.930618e-01	2.016812e-01
253	254	255	256	257	258
2.022297e-01	1.975983e-01	1.952732e-01	1.924059e-01	1.800690e-01	1.395191e-01
259	260	261	262	263	264
1.958292e-01	1.795154e-01	1.851751e-01	1.859766e-01	1.956270e-01	1.839054e-01
265	266	267	268	269	270
1.963112e-01	1.932241e-01	1.876123e-01	1.950997e-01	1.891817e-01	1.977480e-01
271	272	273	274	275	276
1.874560e-01	1.909305e-01	1.721771e-01	1.692183e-01	1.892574e-01	1.927177e-01
277	278	279	280	281	282
2.044159e-01	1.636417e-01	1.806688e-01	1.647719e-01	1.924037e-01	1.957860e-01
283	284	285	286	287	288
1.602403e-01	1.910985e-01	1.949724e-01	1.837158e-01	1.846571e-01	1.941574e-01
289	290	291	292	293	294
1.614719e-01	1.772221e-01	1.923119e-01	1.749266e-01	1.891273e-01	1.660066e-01
295	296	297	298	299	300
1.918453e-01	1.898883e-01	1.922436e-01	1.903095e-01	2.000163e-01	1.757944e-01
301	302	303	304	305	306

1.839681e-01	1.790823e-01	1.866863e-01	1.906360e-01	1.861292e-01	1.644718e-01
307	308	309	310	311	312
1.864900e-01	1.987967e-01	1.893986e-01	1.936064e-01	1.852550e-01	1.739432e-01
313	314	315	316	317	318
1.885451e-01	1.828002e-01	1.617942e-01	1.988106e-01	1.765295e-01	1.901021e-01
319	320	321	322	323	324
1.658134e-01	1.784837e-01	1.926816e-01	1.823337e-01	1.954141e-01	1.181367e-01
325	326	327	328	329	330
1.900379e-01	1.656088e-01	1.887539e-01	1.785333e-01	1.944372e-01	1.849531e-01
331	332	333	334	335	336
1.658169e-01	1.879418e-01	2.042808e-01	1.616299e-01	5.581769e-03	1.946699e-01
337	338	339	340	341	342
1.697275e-01	1.916286e-01	3.421810e-01	1.892661e-01	1.804948e-01	1.841726e-01
343	344	345	346	347	348
2.006368e-01	1.568574e-01	1.955991e-01	1.610562e-01	1.948796e-01	1.882322e-01
349	350	351	352	353	354
1.796451e-01	1.837024e-01	1.890471e-01	1.826870e-01	1.862861e-01	1.923831e-01
355	356	357	358	359	360
1.691774e-01	1.919204e-01	1.909210e-01	1.656946e-01	1.892543e-01	1.848035e-01
361	362	363	364	365	366
1.841337e-01	1.649505e-01	2.010412e-01	1.869363e-01	1.942143e-01	1.819484e-01
367	368	369	370	371	372
1.952404e-01	1.999060e-01	1.990440e-01	1.995847e-01	1.988609e-01	2.003483e-01
373	374	375	376	377	378
1.416081e-01	1.972213e-01	1.983446e-01	1.995246e-01	1.570628e-01	1.985137e-01
379	380	381	382	383	384
2.001540e-01	1.954886e-01	1.842075e-01	1.938056e-01	5.288456e-02	1.627166e-01
385	386	387	388	389	390
1.981046e-01	1.646659e-01	1.940334e-01	1.901849e-01	1.690284e-01	1.999567e-01
391	392	393	394	395	396
1.774444e-01	6.202683e-02	1.910255e-01	2.007127e-01	1.584133e-01	2.005805e-01
397	398	399	400	401	402
1.945603e-01	1.746599e-01	1.669951e-01	1.970266e-01	2.020612e-01	1.948625e-01
403	404	405	406	407	408
2.032282e-01	1.969990e-01	1.648579e-01	1.715591e-01	1.707297e-01	1.559873e-01
409	410	411	412	413	414
1.906382e-01	1.627346e-01	1.911897e-01	1.893651e-01	1.967955e-01	1.882699e-01
415	416	417	418	419	420
1.662979e-01	2.013004e-01	1.676904e-01	2.007835e-01	2.002523e-01	3.805411e-01
421	422	423	424	425	426
1.916613e-01	1.988410e-01	1.966674e-01	2.010637e-01	1.996604e-01	1.835647e-01
427	428	429	430	431	432
1.736740e-01	1.557688e-01	1.157788e-01	1.961666e-01	1.907560e-01	1.564009e-01
433	434	435	436	437	438
2.005455e-01	2.014130e-01	1.848099e-01	1.976147e-01	1.717607e-01	1.881651e-01
439	440	441	442	443	444
1.630879e-01	1.892994e-01	1.992678e-01	1.967028e-01	1.875616e-01	2.003217e-01
445	446	447	448	449	450
1.933004e-01	1.967122e-01	2.110618e-04	2.049050e-01	1.946169e-01	1.976412e-01
451	452	453	454	455	456
1.804152e-01	1.730754e-01	2.015474e-01	1.835499e-01	1.953774e-01	1.918751e-01
457	458	459	460	461	462
2.045509e-01	1.957241e-01	3.497981e-01	1.909377e-01	1.744733e-01	1.914763e-01
463	464	465	466	467	468
2.154240e-01	1.935008e-01	2.009059e-01	1.347247e-01	2.011161e-01	1.930808e-01
469	470	471	472	473	474
2.003822e-01	1.948048e-01	1.934707e-01	1.902081e-01	1.788147e-01	1.795019e-01
475	476	477	478	479	480
1.386901e-01	1.758021e-01	1.770410e-01	1.956842e-01	1.964524e-01	1.590988e-01
481	482	483	484	485	486
1.768965e-01	1.814309e-01	1.830481e-01	1.732900e-01	1.896394e-01	1.697558e-01
487	488	489	490	491	492
1.952825e-01	2.023985e-01	1.974738e-01	2.018127e-01	1.926409e-01	2.011792e-01
493	494	495	496	497	498
1.994982e-01	8.372590e-02	1.975254e-01	1.926680e-01	1.909628e-01	2.005415e-01
499	500	501	502	503	504

1.959129e-01	2.014990e-01	1.863739e-01	1.788691e-01	1.934030e-01	1.991101e-01
505	506	507	508	509	510
1.774194e-01	1.628108e-01	2.049827e-01	2.009856e-01	3.504092e-01	1.839498e-01
511	512	513	514	515	516
9.916767e-02	1.892934e-01	1.824738e-01	2.008815e-01	1.636674e-01	1.956258e-01
517	518	519	520	521	522
1.646756e-01	1.976245e-01	2.021175e-01	1.783690e-01	1.654213e-01	1.578470e-01
523	524	525	526	527	528
1.906705e-01	2.012600e-01	1.881912e-01	1.603872e-01	1.791295e-01	1.900126e-01
529	530	531	532	533	534
1.851629e-01	1.978404e-01	1.690005e-01	1.892593e-01	1.889268e-01	1.224789e-01
535	536	537	538	539	540
1.719684e-01	1.751564e-01	1.993200e-01	1.930396e-01	1.979982e-01	1.974480e-01
541	542	543	544	545	546
1.966680e-01	1.897159e-01	1.962986e-01	2.021171e-01	2.033528e-01	1.861832e-01
547	548	549	550	551	552
2.007889e-01	1.986972e-01	1.995311e-01	1.870795e-01	1.846170e-01	1.923818e-01
553	554	555	556	557	558
1.993318e-01	1.789451e-01	2.027459e-01	1.958214e-01	1.818154e-01	1.750456e-01
559	560	561	562	563	564
1.873801e-01	1.841248e-01	1.155381e-01	1.988446e-01	3.663861e-01	1.906222e-01
565	566	567	568	569	570
2.028640e-01	9.717482e-02	1.585512e-01	2.070499e-01	1.731900e-01	9.387780e-02
571	572	573	574	575	576
1.891145e-01	1.619543e-01	3.971813e-01	1.731900e-01	1.691754e-01	1.969216e-01
577	578	579	580	581	582
1.684714e-01	1.931504e-01	1.981419e-01	1.829419e-01	1.892039e-01	1.905655e-01
583	584	585	586	587	588
1.436535e-01	1.898607e-01	1.962053e-01	1.929396e-01	1.716653e-01	1.884670e-01
589	590	591	592	593	594
1.990526e-01	2.014343e-01	1.980798e-01	1.890329e-01	1.134499e-01	1.700825e-01
595	596	597	598	599	600
1.881404e-01	1.634740e-01	3.906180e-01	1.520178e-01	1.671943e-01	1.945495e-01
601	602	603	604	605	606
1.684996e-01	1.828039e-01	1.958785e-01	1.894069e-01	2.012859e-01	1.943308e-01
607	608	609	610	611	612
1.660254e-01	1.856327e-01	1.797410e-01	1.962377e-01	1.934094e-01	1.688326e-01
613	614	615	616	617	618
1.940153e-01	1.297899e-01	1.546355e-01	1.386060e-01	1.973084e-01	1.523500e-01
619	620	621	622	623	624
1.331570e-01	1.940948e-01	1.690969e-01	2.028310e-01	1.904359e-01	2.031153e-01
625	626	627	628	629	630
1.830472e-01	1.583364e-01	1.806403e-01	1.893773e-01	1.422106e-01	1.921030e-01
631	632	633	634	635	636
1.093531e-01	1.895876e-01	2.006232e-01	1.689658e-01	1.941163e-01	1.515097e-01
637	638	639	640	641	642
3.997981e-01	1.739306e-01	1.940021e-01	1.902009e-01	1.854194e-01	1.856112e-01
643	644	645	646	647	648
1.949099e-01	2.001121e-01	1.945345e-01	1.726073e-01	1.850113e-01	1.938896e-01
649	650	651	652	653	654
1.864400e-01	2.112995e-01	1.858996e-01	1.869431e-01	1.980174e-01	1.959221e-01
655	656	657	658	659	660
1.911995e-01	2.103199e-01	1.639502e-01	2.103112e-01	2.033365e-01	1.713205e-01
661	662	663	664	665	666
1.941950e-01	1.682658e-01	1.962700e-01	1.669028e-01	1.884161e-01	1.947293e-01
667	668	669	670	671	672
1.897674e-01	1.859639e-01	1.933707e-01	1.889979e-01	1.799154e-01	1.913277e-01
673	674	675	676	677	678
1.988126e-01	1.903735e-01	1.937972e-01	1.911219e-01	1.929670e-01	1.918272e-01
679	680	681	682	683	684
1.811737e-01	2.002309e-01	1.898061e-01	1.899662e-01	1.931529e-01	1.978648e-01
685	686	687	688	689	690
2.015618e-01	1.804723e-01	1.863202e-01	1.865912e-01	1.898443e-01	3.810839e-01
691	692	693	694	695	696
1.722194e-01	1.890757e-01	1.804782e-01	1.661350e-01	1.660943e-01	1.546340e-01
697	698	699	700	701	702

2.014835e-01	1.906692e-01	1.941195e-01	1.515695e-01	1.879383e-01	1.815353e-01
703	704	705	706	707	708
1.712552e-01	1.933340e-01	2.039904e-01	1.587723e-01	1.972708e-01	1.930432e-01
709	710	711	712	713	714
1.817581e-01	1.844726e-01	1.930756e-01	1.933885e-01	1.980684e-01	2.019405e-01
715	716	717	718	719	720
1.907527e-01	1.883629e-01	1.800589e-01	1.795190e-01	1.788819e-01	1.288416e-01
721	722	723	724	725	726
1.977781e-01	1.910742e-01	1.980701e-01	1.866795e-01	1.767365e-01	1.781914e-01
727	728	729	730	731	732
1.913295e-01	1.995322e-01	1.726206e-01	1.839593e-01	1.876279e-01	1.882352e-01
733	734	735	736	737	738
1.913164e-01	1.955339e-01	1.915829e-01	1.904943e-01	1.896502e-01	1.720745e-01
739	740	741	742	743	744
1.983633e-01	1.813838e-01	1.890749e-01	1.949904e-01	1.799498e-01	1.736246e-01
745	746	747	748	749	750
1.879466e-01	1.714543e-01	1.636360e-01	1.856100e-01	1.911908e-01	1.999737e-01
751	752	753	754	755	756
1.987155e-01	1.880975e-01	1.893793e-01	1.616651e-01	1.800337e-01	2.016461e-01
757	758	759	760	761	762
1.223697e-01	7.791820e-02	1.924164e-01	2.028183e-01	1.703929e-01	1.904500e-01
763	764	765	766	767	768
1.906041e-01	1.499367e-01	1.939840e-01	1.822461e-01	1.899833e-01	3.390053e-01
769	770	771	772	773	774
1.974100e-01	1.944268e-01	2.006225e-01	1.970080e-01	1.934809e-01	1.928682e-01
775	776	777	778	779	780
1.985565e-01	1.864756e-01	1.944579e-01	1.942776e-01	2.016790e-01	1.818782e-01
781	782	783	784	785	786
1.606682e-01	1.714910e-01	2.011499e-01	1.913811e-01	1.577935e-01	1.802854e-01
787	788	789	790	791	792
1.875061e-01	1.666116e-01	1.959729e-01	1.827397e-01	1.826700e-01	1.751064e-01
793	794	795	796	797	798
1.874828e-01	1.966919e-01	1.499011e-01	1.971068e-01	1.948511e-01	1.882795e-01
799	800	801	802	803	804
1.874492e-01	1.926923e-01	1.740401e-01	1.995113e-01	1.961760e-01	1.866916e-01
805	806	807	808	809	810
1.715591e-01	3.900053e-01	1.977980e-01	1.911613e-01	1.973724e-01	1.708989e-01
811	812	813	814	815	816
2.082436e-01	2.037908e-01	1.829951e-01	1.936200e-01	1.651120e-01	1.874965e-01
817	818	819	820	821	822
1.826668e-01	1.893784e-01	1.594072e-01	2.017052e-01	1.756134e-01	1.924279e-01
823	824	825	826	827	828
1.770287e-01	2.004408e-01	1.950838e-01	2.097260e-01	1.960422e-01	1.894506e-01
829	830	831	832	833	834
2.006599e-01	1.735170e-01	1.773223e-01	2.015337e-01	2.003188e-01	1.924650e-01
835	836	837	838	839	840
1.841726e-01	2.100988e-01	2.069982e-01	1.989847e-01	4.126645e-01	1.932252e-01
841	842	843	844	845	846
1.968175e-01	1.651981e-01	1.954028e-01	1.917823e-01	2.062084e-01	1.841785e-01
847	848	849	850	851	852
2.010216e-01	2.083039e-01	2.073584e-01	1.795860e-01	1.938737e-01	1.991182e-01
853	854	855	856	857	858
4.028927e-01	1.749988e-01	1.921967e-01	1.876333e-01	1.842568e-01	1.881862e-01
859	860	861	862	863	864
1.823790e-01	1.911585e-01	1.706198e-01	1.935313e-01	1.979187e-01	1.732005e-01
865	866	867	868	869	870
1.815257e-01	1.980107e-01	1.259854e-01	2.011014e-01	1.854842e-01	1.668693e-01
871	872	873	874	875	876
1.946857e-01	1.814553e-01	2.000423e-01	1.912985e-01	1.532048e-01	1.812122e-01
877	878	879	880	881	882
1.922973e-01	1.849706e-01	1.940848e-01	2.022705e-01	1.891832e-01	1.937235e-01
883	884	885	886	887	888
2.002690e-01	1.911478e-01	3.901853e-01	2.007540e-01	1.942459e-01	1.853190e-01
889	890	891	892	893	894
1.958062e-01	1.643878e-01	1.803091e-01	2.031328e-01	1.925973e-01	1.968341e-01
895	896	897	898	899	900

```

1.981397e-01 1.983061e-01 1.985507e-01 1.909265e-01 1.859753e-01 1.967197e-01
901 902 903 904 905 906
1.874655e-01 1.474198e-01 1.915709e-01 1.988232e-01 1.871811e-01 1.949976e-01
907 908 909 910 911 912
1.979439e-01 1.919618e-01 5.799356e-02 1.910813e-01 1.949223e-01 1.907636e-01
913 914 915 916 917 918
2.019210e-01 1.767180e-01 1.743693e-01 1.989856e-01 6.006143e-02 2.008813e-01
919 920 921 922 923 924
1.919115e-01 2.002873e-01 2.931878e-05 1.870317e-01 1.793311e-01 1.766908e-01
925 926 927 928 929 930
2.038595e-01 1.980326e-01 1.729807e-01 1.635392e-01 2.007103e-01 1.998947e-01
931 932 933 934 935 936
1.886108e-01 1.742924e-01 3.948058e-01 4.073937e-01 2.164694e-01 2.021979e-01
937 938 939 940 941 942
2.002145e-01 2.017704e-01 1.982228e-01 1.925866e-01 1.994001e-01 3.870368e-01
943 944 945 946 947 948
1.654435e-01 1.899780e-01 1.858625e-01 1.875434e-01 1.533102e-01 1.675600e-01
949 950 951 952 953 954
1.248246e-01 1.601029e-01 1.864855e-01 1.841967e-01 1.886809e-01 1.726440e-01
955 956 957 958 959 960
1.885299e-01 1.883506e-01 1.783199e-01 1.872305e-01 1.937074e-01 2.008132e-01
961 962 963 964 965 966
1.677218e-01 1.809944e-01 1.970335e-01 1.811264e-01 1.968068e-01 1.637825e-01
967 968 969 970 971 972
1.607394e-01 1.769734e-01 1.712984e-01 1.931160e-01 1.965933e-01 1.981776e-01
973 974 975 976 977 978
1.893093e-01 1.905737e-01 2.131108e-01 1.900680e-01 1.888149e-01 1.631605e-01
979 980 981 982 983 984
1.523678e-01 1.847067e-01 1.742145e-01 1.843940e-01 1.962166e-01 1.857717e-01
985 986 987 988 989 990
1.572864e-01 1.917129e-01 1.883306e-01 1.914056e-01 1.749465e-01 1.878626e-01
991 992 993 994 995 996
1.816615e-01 1.928973e-01 2.032419e-01 1.961523e-01 1.945446e-01 1.901427e-01
997 998 999 1000
1.851427e-01 1.990590e-01 1.586964e-01 1.634285e-01
[ reached getOption("max.print") -- omitted 44211 entries ]
> final_y <- cbind(bank, prob)
> confusion_y <- table(prob>0.5, bank$y)
> table(prob>0.5)

```

```

FALSE TRUE
45142 69
> confusion_y

```

```

      no  yes
FALSE 39864 5278
TRUE   58   11
> Accuracy1 <- sum(diag(confusion_y)/sum(confusion_y))
> Accuracy1
[1] 0.8819756

```

```

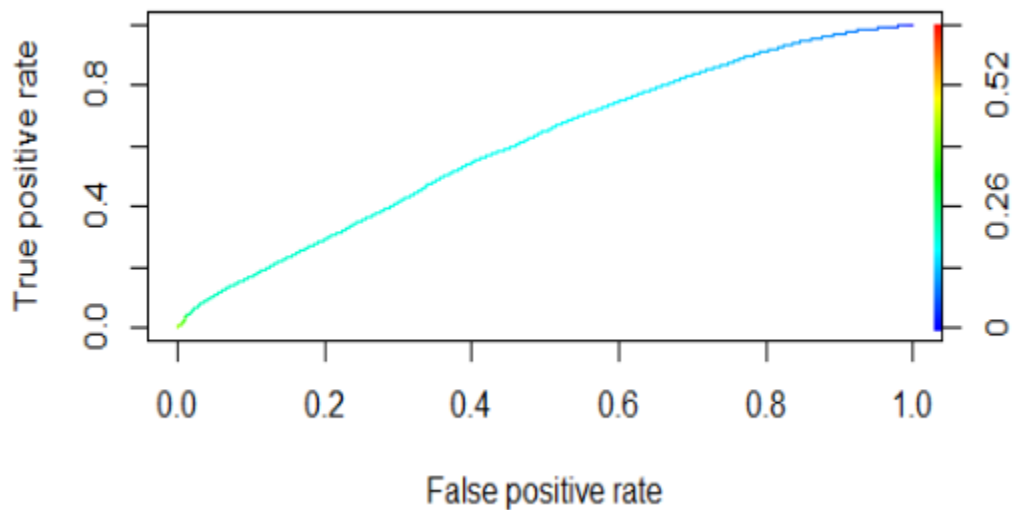
> threshold=0.5
> predicted_values<-ifelse(predict(fit1,type="response")>threshold,1,0)
> actual_values<-fit1$y
> conf_matrix<-table(predicted_values,actual_values)
> conf_matrix
      actual_values
predicted_values 0 1
0 37965 7240
1 2 4
> library(caret)
> specificity(conf_matrix)
[1] 0.0005521811
> sensitivity(conf_matrix)
[1] 0.9999473
> Accuracy <- sum(diag(conf_matrix)/sum(conf_matrix))

```

```

> Accuracy
[1] 0.839817
> #changing threshold
> threshold=0.8
> predicted_values<-ifelse(predict(fit1,type="response")>threshold,1,0)
> actual_values<-fit1$y
> conf_matrix1<-table(predicted_values,actual_values)
> conf_matrix1
      actual_values
predicted_values 0    1
               0 37967 7244
> Accuracy2<- sum(diag(conf_matrix1)/sum(conf_matrix1))
> Accuracy2
[1] 0.8397735
> rocpred <- prediction(probl,bank$loan)
> rocpref <- performance(rocpred,"tpr","fpr")
> plot(rocpref,colsize=T,text.adj=c(0.2,1.7))

```



Conclusion- Model accuracy = 0.8819756 that is 88.19%

Problem statement 2

Classify whether application accepted or not using Logistic regression

Answer:

Rcode:

```
#Classify whether application accepted or not using Logistic regression
```

```
CreditCard <- read.csv(file.choose())
```

```
View(CreditCard)
```

```
colnames(CreditCard)
```

```
class(CreditCard)
```

```
summary(CreditCard)
```

```
str(CreditCard)
```

```
dim(CreditCard)
```

```
library(plyr)
```

```
CreditCard$card <- ifelse(CreditCard$card=="yes",1,0)
```

```
CreditCard$owner <- ifelse(CreditCard$owner=="yes",1,0)
```

```
CreditCard$selfemp <- ifelse(CreditCard$selfemp=="yes",1,0)
```

```
CreditCard <- CreditCard[,-1]
```

```
View(CreditCard)
```

```
var(CreditCard)
```

```
boxplot(CreditCard$card,horizontal = T)
```

```
boxplot(CreditCard$age,horizontal = T)
```

```
boxplot(CreditCard$income,horizontal = T)
```

```
boxplot(CreditCard$share,horizontal = T)
```

```
boxplot(CreditCard$expenditure, horizontal = T)
boxplot(CreditCard$owner, horizontal = T)
boxplot(CreditCard$dependents, horizontal = T)
boxplot(CreditCard$months, horizontal = T)
boxplot(CreditCard$active, horizontal = T)
```

```
hist(CreditCard$card)
hist(CreditCard$age)
hist(CreditCard$income)
hist(CreditCard$share)
hist(CreditCard$expenditure)
hist(CreditCard$owner)
hist(CreditCard$dependents)
hist(CreditCard$months)
hist(CreditCard$active)
attach(CreditCard)
```

```
library(moments)
skewness(card)
skewness(age)
skewness(income)
skewness(share)
skewness(expenditure)
skewness(owner)
skewness(dependents)
skewness(months)
```

```
skewness(active)
CreditCard_model <- glm(card~.,data = CreditCard,family = "binomial")
summary(CreditCard_model)
prob <- predict(CreditCard_model,type="response")
```

```
final <- cbind(CreditCard, prob)
confusion_matrix <- table(prob>0.5, CreditCard$card)
table(prob>0.5)
confusion_matrix
Accuracy1 <- sum(diag(confusion_matrix)/sum(confusion_matrix))
Accuracy1
View(CreditCard)
```

```
model2 <-
glm(card~factor(reports)+factor(income)+factor(share)+factor(expenditure)+owner+age+
selfemp+dependents+months+majorcards+active,data = CreditCard,family =
"binomial")
summary(model2)
exp(coef(model2))
prob1 <- predict(model2,type = "response")
final1 <- cbind(CreditCard,prob1)
confusion_matrix1 <- table(prob1>0.5,CreditCard$card)
table(prob1>0.5)
confusion_matrix1
Accuracy2 <- sum(diag(confusion_matrix1)/sum(confusion_matrix1))
Accuracy2
```

```

threshold=0.5
predicted_values<-ifelse(predict(model2,type="response")>threshold,1,0)
actual_values<-CreditCard$card
conf_matrix<-table(predicted_values,actual_values)
conf_matrix
library(caret)
specificity(conf_matrix)
sensitivity(conf_matrix)

predicted_values1<-ifelse(predict(CreditCard_model,type="response")>threshold,1,0)
actual_values1<-CreditCard$card
conf_matrix1<-table(predicted_values1,actual_values1)
conf_matrix1
library(caret)
specificity(conf_matrix1)
sensitivity(conf_matrix1)

```

##Roc curve

```

library(ROCR)
rocpred <- prediction(prob1,CreditCard$card)
rocprep <- performance(rocpred,"tpr","fpr")
plot(rocprep,colorize=T,text.adj=c(-0.2,1.7))

```

Console:

```

> CreditCard <- read.csv(file.choose())
> View(CreditCard)

```


CreditCard.R x CreditCard x bank10.R x Claimants_RCode.R x bank.R x Untitled1* x										
Filter										
	X	card	reports	age	income	share	expenditure	owner	selfemp	dependen
1	1	yes	0	37.66667	4.5200	0.0332699100	124.983300	yes	no	3
2	2	yes	0	33.25000	2.4200	0.0052169420	9.854167	no	no	3
3	3	yes	0	33.66667	4.5000	0.0041555560	15.000000	yes	no	4
4	4	yes	0	30.50000	2.5400	0.0652137800	137.869200	no	no	0
5	5	yes	0	32.16667	9.7867	0.0670505900	546.503300	yes	no	2
6	6	yes	0	23.25000	2.5000	0.0444384000	91.996670	no	no	0
7	7	yes	0	27.91667	3.9600	0.0125757600	40.833330	no	no	2
8	8	yes	0	29.16667	2.3700	0.0764337600	150.790000	yes	no	0
9	9	yes	0	37.00000	3.8000	0.2456279000	777.821700	yes	no	0
10	10	yes	0	28.41667	3.2000	0.0197800000	52.580000	no	no	0
11	11	yes	0	30.50000	3.9500	0.0780245600	256.664200	yes	no	1
12	12	no	0	42.00000	1.9800	0.0006060606	0.000000	yes	no	2

Showing 1 to 13 of 1,319 entries, 13 total columns

```

> colnames(CreditCard)
[1] "X" "card" "reports" "age" "income"
[6] "share" "expenditure" "owner" "selfemp" "dependents"
[11] "months" "majorcards" "active"
> class(CreditCard)
[1] "data.frame"
> summary(CreditCard)
      X      card      reports      age
Min.   : 1.0    no : 296   Min.   : 0.0000   Min.   : 0.1667
1st Qu.: 330.5  yes:1023  1st Qu.: 0.0000   1st Qu.: 25.4167
Median : 660.0          Median : 0.0000   Median : 31.2500
Mean   : 660.0          Mean   : 0.4564   Mean   : 33.2131
3rd Qu.: 989.5          3rd Qu.: 0.0000   3rd Qu.: 39.4167
Max.   :1319.0         Max.   :14.0000   Max.   : 83.5000

      income      share      expenditure      owner      selfemp
Min.   : 0.210   Min.   :0.0001091   Min.   : 0.000   no : 738   no :1228
1st Qu.: 2.244   1st Qu.:0.0023159   1st Qu.: 4.583   yes:581   yes: 91
Median : 2.900   Median :0.0388272   Median : 101.298
Mean   : 3.365   Mean   :0.0687322   Mean   : 185.057
3rd Qu.: 4.000   3rd Qu.:0.0936168   3rd Qu.: 249.036
Max.   :13.500   Max.   :0.9063205   Max.   :3099.505

      dependents      months      majorcards      active
Min.   :0.0000   Min.   : 0.00   Min.   :0.0000   Min.   : 0.000
1st Qu.:0.0000   1st Qu.: 12.00   1st Qu.:1.0000   1st Qu.: 2.000
Median :1.0000   Median : 30.00   Median :1.0000   Median : 6.000
Mean   :0.9939   Mean   : 55.27   Mean   :0.8173   Mean   : 6.997
3rd Qu.:2.0000   3rd Qu.: 72.00   3rd Qu.:1.0000   3rd Qu.:11.000
Max.   :6.0000   Max.   :540.00   Max.   :1.0000   Max.   :46.000

> str(CreditCard)
'data.frame': 1319 obs. of 13 variables:
 $ X      : int  1 2 3 4 5 6 7 8 9 10 ...
 $ card   : Factor w/ 2 levels "no","yes": 2 2 2 2 2 2 2 2 2 2 ...
 $ reports: int  0 0 0 0 0 0 0 0 0 0 ...
 $ age    : num  37.7 33.2 33.7 30.5 32.2 ...
 $ income : num  4.52 2.42 4.5 2.54 9.79 ...

```

```

$ share      : num  0.03327 0.00522 0.00416 0.06521 0.06705 ...
$ expenditure: num  124.98 9.85 15 137.87 546.5 ...
$ owner      : Factor w/ 2 levels "no","yes": 2 1 2 1 2 1 1 2 2 1 ...
$ selfemp    : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...
$ dependents : int   3 3 4 0 2 0 2 0 0 0 ...
$ months     : int   54 34 58 25 64 54 7 77 97 65 ...
$ majorcards : int   1 1 1 1 1 1 1 1 1 1 ...
$ active     : int   12 13 5 7 5 1 5 3 6 18 ...

```

```

> dim(CreditCard)
[1] 1319 13
> library(plyr)
> CreditCard$card <- ifelse(CreditCard$card=="yes",1,0)
> CreditCard$owner <- ifelse(CreditCard$owner=="yes",1,0)
> CreditCard$selfemp <- ifelse(CreditCard$selfemp=="yes",1,0)
> CreditCard <- CreditCard[,-1]
> View(CreditCard)

```

	card	reports	age	income	share	expenditure	owner	selfemp	dependents
1	1	0	37.66667	4.5200	0.0332699100	124.983300	1	0	3
2	1	0	33.25000	2.4200	0.0052169420	9.854167	0	0	3
3	1	0	33.66667	4.5000	0.0041555560	15.000000	1	0	4
4	1	0	30.50000	2.5400	0.0652137800	137.869200	0	0	0
5	1	0	32.16667	9.7867	0.0670505900	546.503300	1	0	2
6	1	0	23.25000	2.5000	0.0444384000	91.996670	0	0	0
7	1	0	27.91667	3.9600	0.0125757600	40.833330	0	0	2
8	1	0	29.16667	2.3700	0.0764337600	150.790000	1	0	0
9	1	0	37.00000	3.8000	0.2456279000	777.821700	1	0	0
10	1	0	28.41667	3.2000	0.0197800000	52.580000	0	0	0
11	1	0	30.50000	3.9500	0.0780245600	256.664200	1	0	1
12	0	0	42.00000	1.9800	0.0006060606	0.000000	1	0	2
13	0	0	30.00000	1.7300	0.0006936416	0.000000	1	0	1

Showing 1 to 14 of 1,319 entries, 12 total columns

```

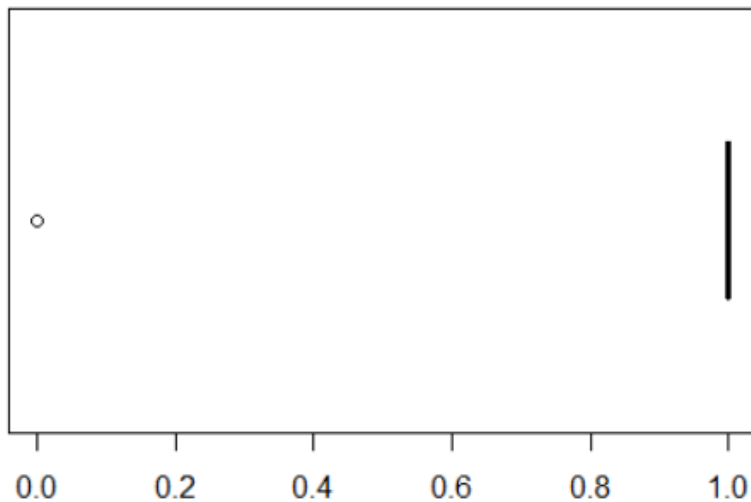
> var(CreditCard)

```

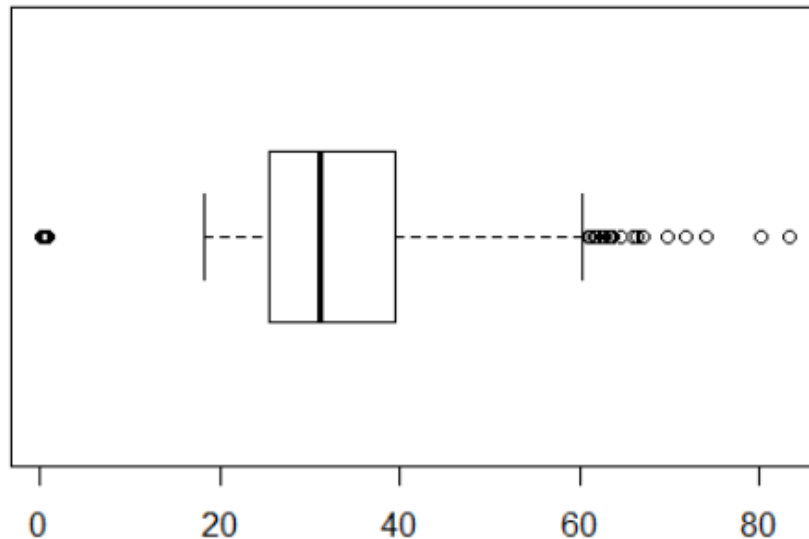
	card	reports	age	income	share
card	0.174183551	-0.254099935	0.002272567	0.066671175	0.0153289771
reports	-0.254099935	1.809744587	0.601577019	0.025118378	-0.0202479653
age	0.002272567	0.601577019	102.876050120	5.577827004	-0.1110773563
income	0.066671175	0.025118378	5.577827004	2.869303099	-0.0087270358
share	0.015328977	-0.020247965	-0.111077356	-0.008727036	0.0089596760
expenditure	41.560616806	-50.001058851	41.271453096	129.620463470	21.6128565648
owner	0.030640079	-0.035790668	1.852443322	0.273217541	-0.0007410332
selfemp	-0.005749976	0.006424143	0.258237886	0.048226464	-0.0018936095
dependents	-0.018812822	0.033119310	2.684841869	0.671268595	-0.0097576537
months	-0.007422163	4.365621056	293.356495418	14.632388814	-0.3471946784
majorcards	0.017387408	-0.003798229	0.038334222	0.070156621	0.0018833646
active	0.211762026	1.762386666	11.580944907	1.928427469	-0.0140114027
	expenditure	owner	selfemp	dependents	months
card	41.560617	0.0306400789	-0.0057499761	-0.018812822	-7.422163e-03
reports	-50.001059	-0.0357906677	0.0064241430	0.033119310	4.365621e+00
age	41.271453	1.8524433224	0.2582378860	2.684841869	2.933565e+02

income	129.620463	0.2732175412	0.0482264644	0.671268595	1.463239e+01
share	21.612857	-0.0007410332	-0.0018936095	-0.009757654	-3.471947e-01
expenditure	74103.139042	12.5973035742	-2.4596124270	17.887862134	-5.232913e+02
owner	12.597304	0.2466449844	0.0052472271	0.191596268	7.854711e+00
selfemp	-2.459612	0.0052472271	0.0642805455	0.013317097	1.107470e+00
dependents	17.887862	0.1915962684	0.0133170966	1.556867586	3.846086e+00
months	-523.291266	7.8547107122	1.1074703671	3.846085748	4.391944e+03
majorcards	8.157089	0.0122586776	0.0004757133	0.004960764	-1.061838e+00
active	93.937520	0.8609726410	0.0472503541	0.842925447	4.180127e+01
majorcards					
active					
card	0.0173874078	0.21176203			
reports	-0.0037982285	1.76238667			
age	0.0383342219	11.58094491			
income	0.0701566208	1.92842747			
share	0.0018833646	-0.01401140			
expenditure	8.1570886942	93.93751953			
owner	0.0122586776	0.86097264			
selfemp	0.0004757133	0.04725035			
dependents	0.0049607637	0.84292545			
months	-1.0618375534	41.80126746			
majorcards	0.1494430070	0.29155474			
active	0.2915547369	39.76326849			

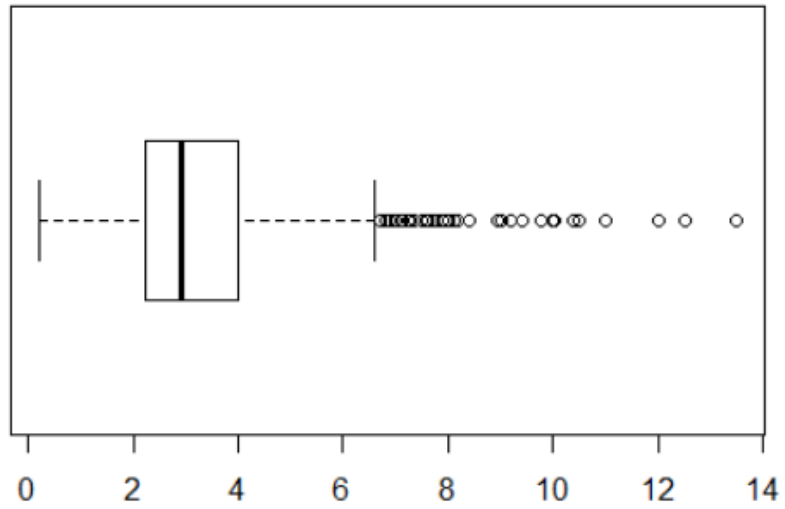
```
> boxplot(CreditCard$card, horizontal = T)
```



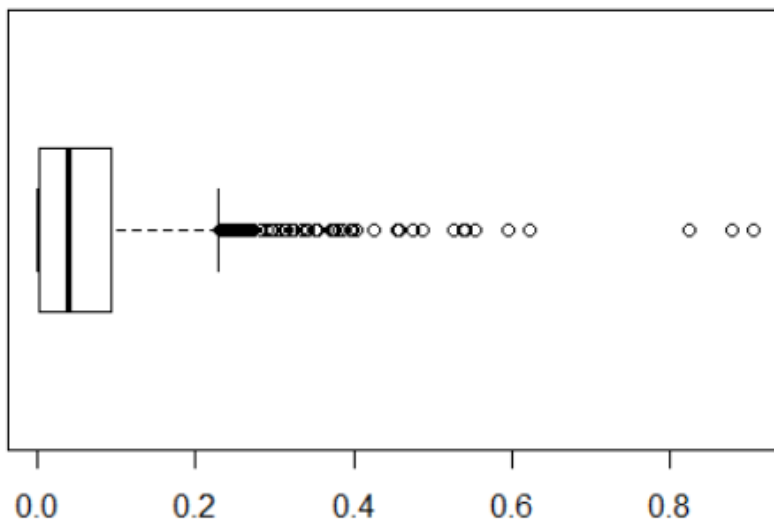
```
> boxplot(CreditCard$age, horizontal = T)
```



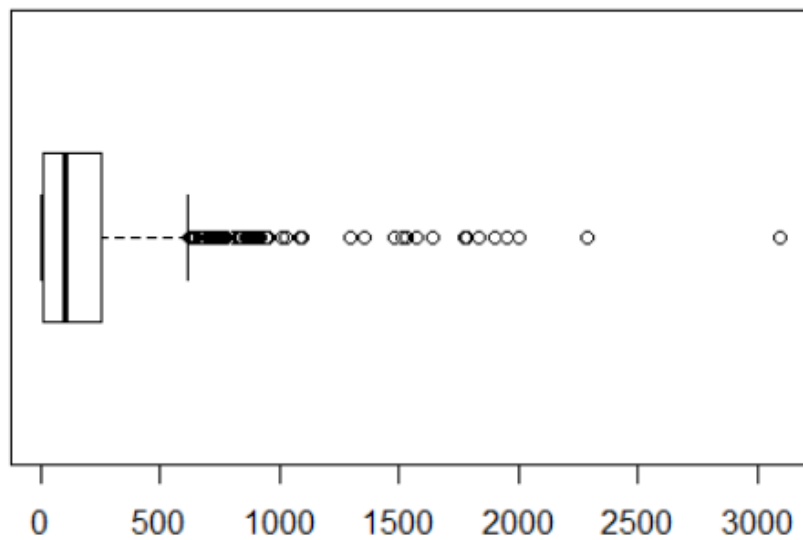
```
> boxplot(CreditCard$income, horizontal = T)
```



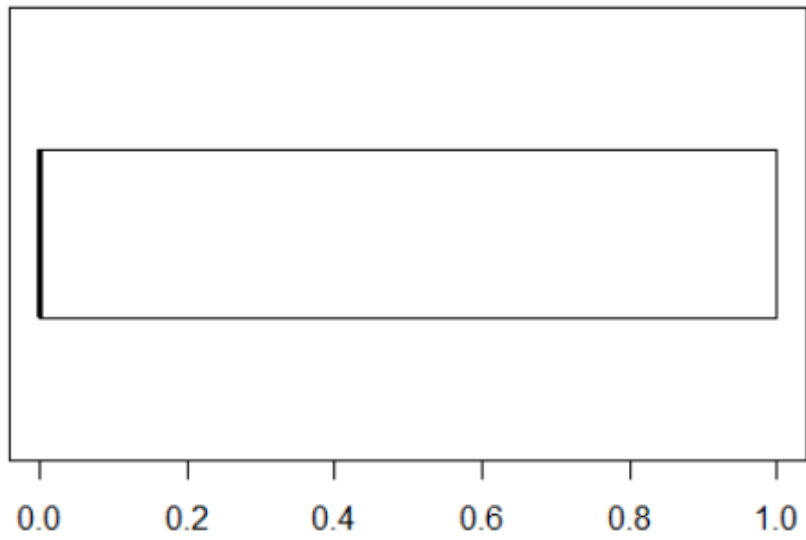
```
> boxplot(CreditCard$share, horizontal = T)
```



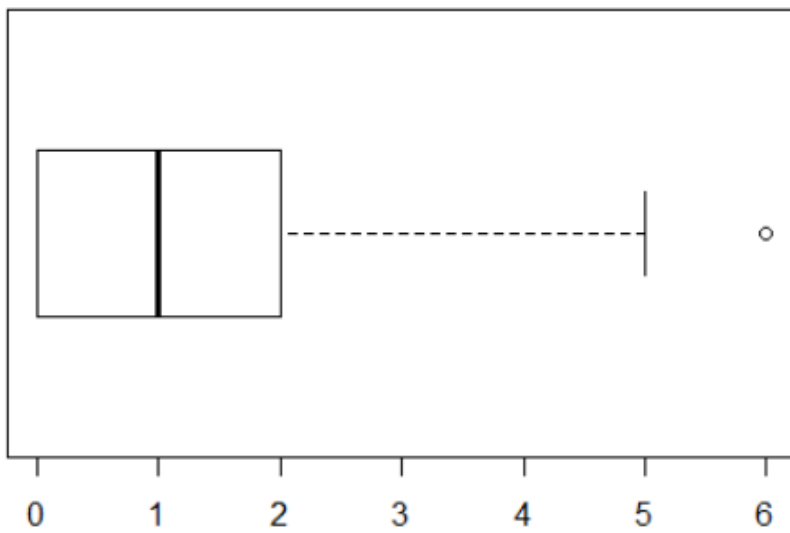
```
> boxplot(CreditCard$expenditure, horizontal = T)
```



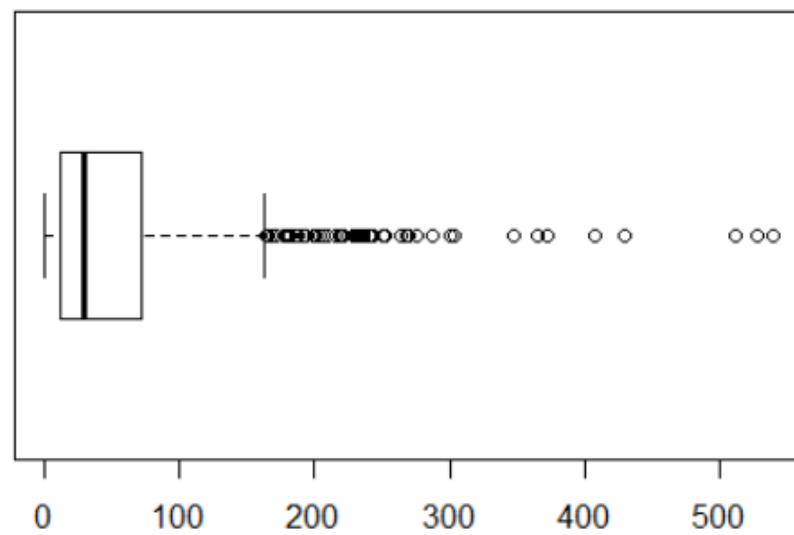
```
> boxplot(CreditCard$owner,horizontal = T)
```



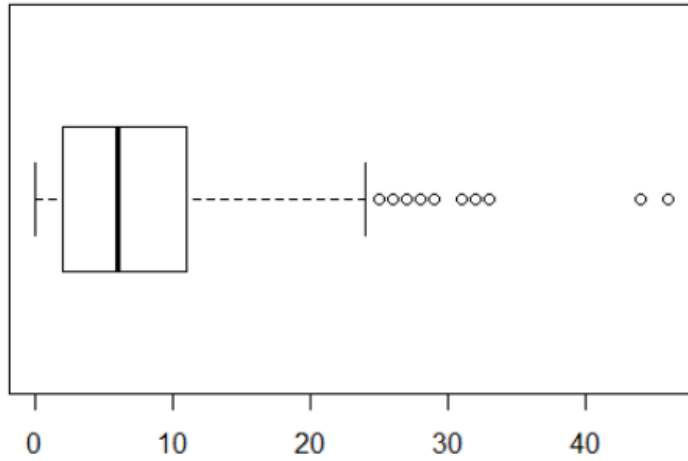
```
> boxplot(CreditCard$dependents,horizontal = T)
```



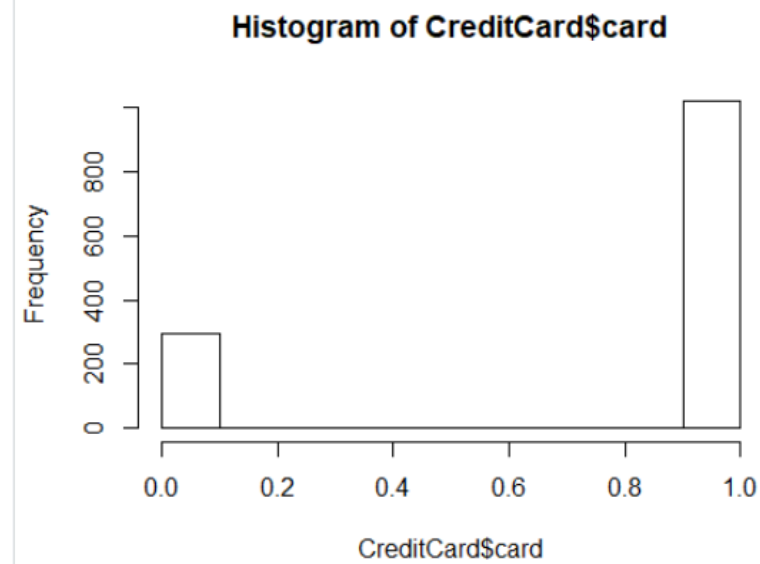
```
> boxplot(CreditCard$months,horizontal = T)
```



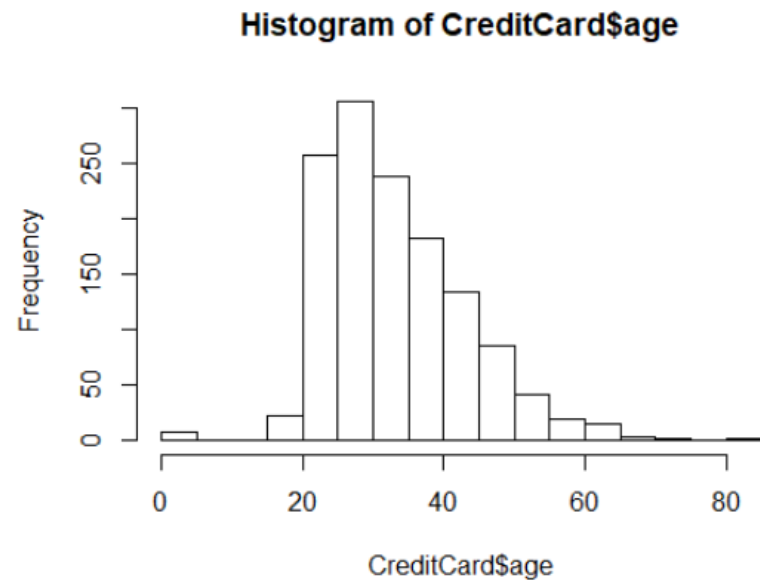
```
> boxplot(CreditCard$active, horizontal = T)
```



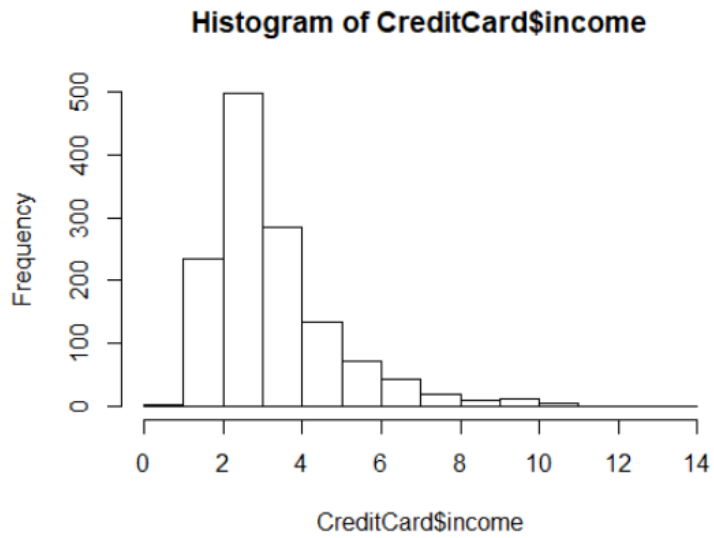
```
> hist(CreditCard$card)
```



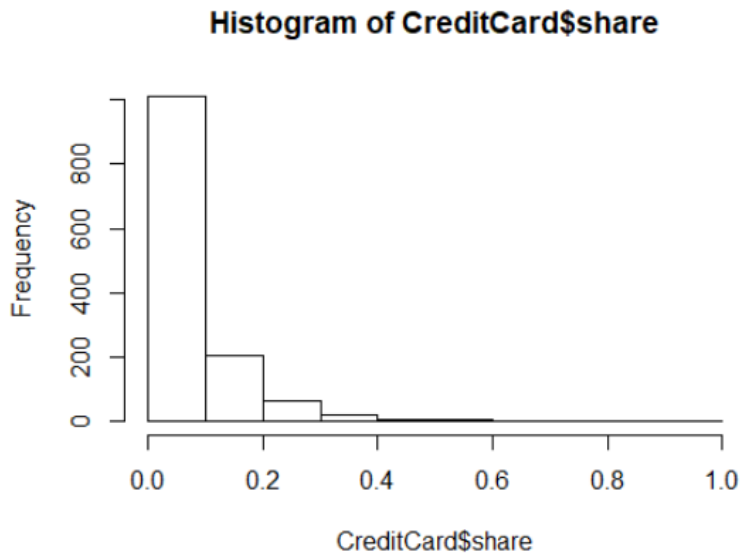
```
> hist(CreditCard$age)
```



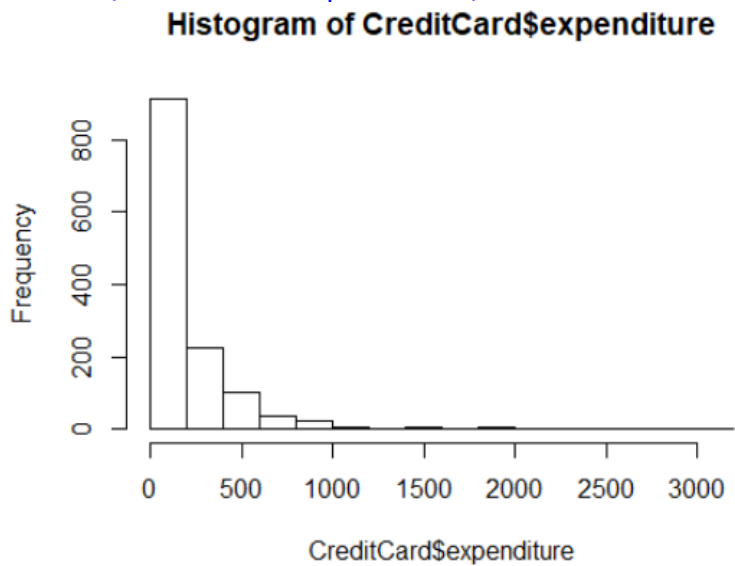
```
> hist(CreditCard$income)
```



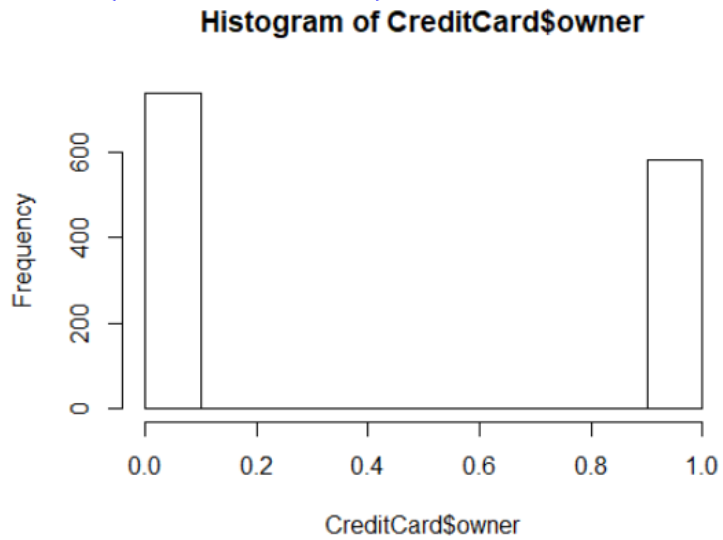
```
> hist(CreditCard$share)
```



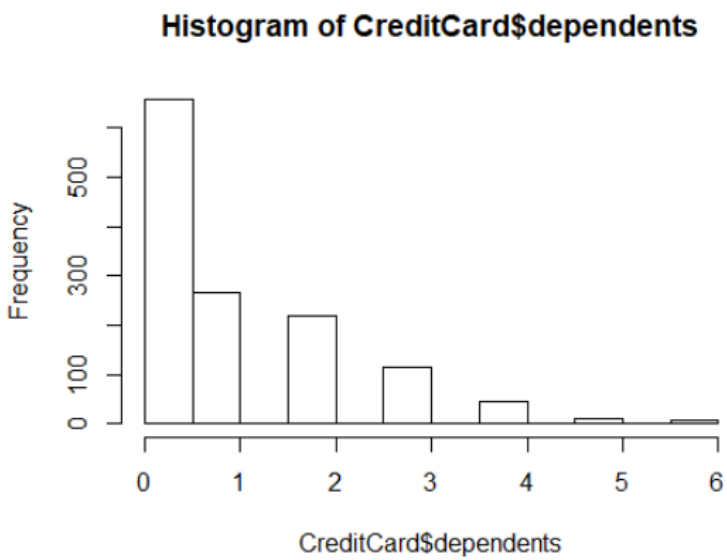
```
> hist(CreditCard$expenditure)
```



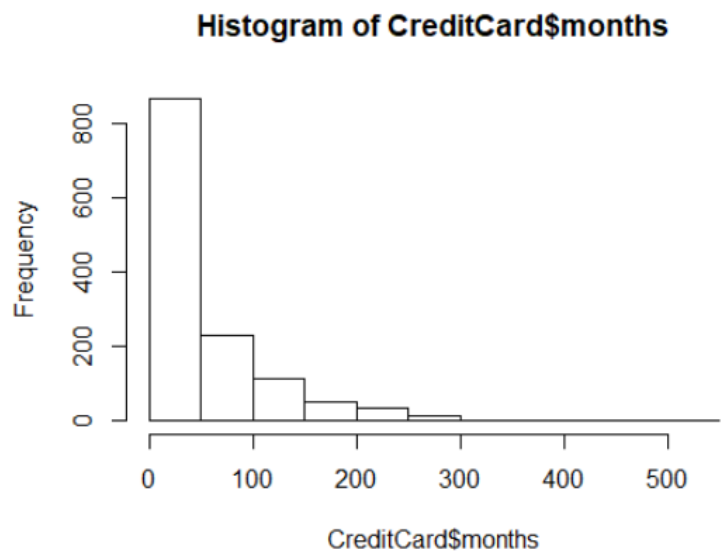
```
> hist(CreditCard$owner)
```



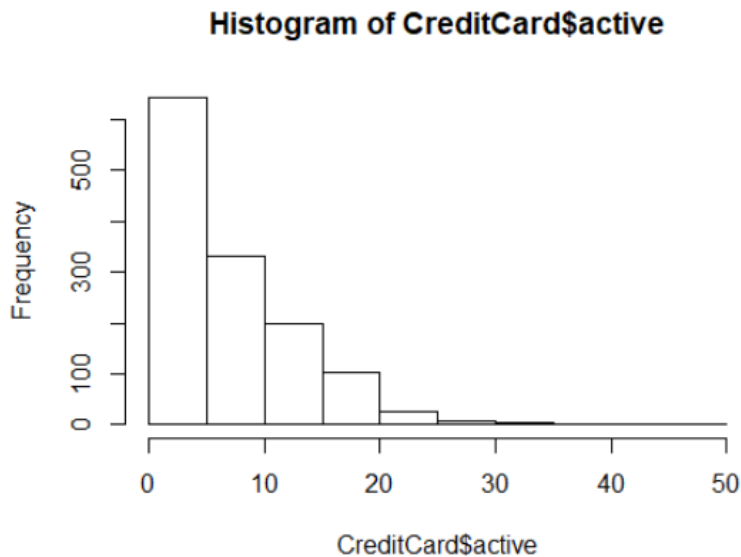
```
> hist(CreditCard$dependents)
```



```
> hist(CreditCard$months)
```




```
> hist(CreditCard$active)
```



```
> attach(CreditCard)
```

```
> CreditCard_model <- glm(card~.,data = CreditCard,family = "binomial")
> summary(CreditCard_model)
```

Call:

```
glm(formula = card ~ ., family = "binomial", data = CreditCard)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-8.49	0.00	0.00	0.00	8.49

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	6.610e+14	8.418e+06	78529581	<2e-16	***
reports	-5.411e+14	1.436e+06	-376913075	<2e-16	***
age	1.015e+12	2.208e+05	4595721	<2e-16	***
income	-4.840e+13	1.470e+06	-32917418	<2e-16	***
share	1.732e+16	4.353e+07	397938311	<2e-16	***
expenditure	-7.184e+11	1.568e+04	-45826822	<2e-16	***
owner	1.262e+11	4.361e+06	28936	<2e-16	***
selfemp	2.868e+14	7.375e+06	38894429	<2e-16	***
dependents	2.155e+13	1.619e+06	13313846	<2e-16	***
months	-1.194e+12	3.140e+04	-38025935	<2e-16	***
majorcards	4.265e+13	4.858e+06	8780075	<2e-16	***
active	8.221e+12	3.175e+05	25897563	<2e-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1404.6 on 1318 degrees of freedom
Residual deviance: 13336.2 on 1307 degrees of freedom
AIC: 13360

Number of Fisher Scoring iterations: 25

```
> prob <- predict(CreditCard_model,type="response")
> final <- cbind(CreditCard, prob)
> confusion_matrix <- table(prob>0.5, CreditCard$card)
> table(prob>0.5)
```

FALSE	TRUE
121	1198

```
> confusion_matrix
```

```
      0      1  
FALSE 116      5  
TRUE  180 1018
```

```
> Accuracy1 <- sum(diag(confusion_matrix)/sum(confusion_matrix))
```

```
> Accuracy1  
[1] 0.8597422
```

```
> model2 <- glm(card~factor(reports)+factor(income)+factor(share)+factor(expenditure)+owner+age+selfemp+dependents+months+majorcards+active,data = CreditCard,family = "binomial")  
> summary(model2)
```

```
Call:
```

```
glm(formula = card ~ factor(reports) + factor(income) + factor(share) +  
    factor(expenditure) + owner + age + selfemp + dependents +  
    months + majorcards + active, family = "binomial", data = CreditCard)
```

```
Deviance Residuals:
```

```
    Min       1Q   Median       3Q      Max  
 -8.49    0.00    0.00    0.00    8.49
```

```
Coefficients: (1408 not defined because of singularities)
```

	Estimate	Std. Error	z value	Pr(> z)	
(Intercept)	-2.459e+15	7.509e+07	-3.275e+07	<2e-16	***
factor(reports)1	-1.287e+15	1.747e+07	-7.367e+07	<2e-16	***
factor(reports)2	-1.529e+15	1.833e+07	-8.339e+07	<2e-16	***
factor(reports)3	-2.903e+15	2.331e+07	-1.245e+08	<2e-16	***
factor(reports)4	-1.474e+15	2.515e+07	-5.858e+07	<2e-16	***
factor(reports)5	-5.518e+14	3.690e+07	-1.496e+07	<2e-16	***
factor(reports)6	1.596e+15	4.710e+07	3.389e+07	<2e-16	***
factor(reports)7	-2.079e+15	3.981e+07	-5.222e+07	<2e-16	***
factor(reports)9	-4.112e+15	5.798e+07	-7.092e+07	<2e-16	***
factor(reports)10	-3.910e+15	8.525e+07	-4.586e+07	<2e-16	***
factor(reports)11	-9.503e+14	4.436e+07	-2.142e+07	<2e-16	***
factor(reports)12	2.633e+15	7.483e+07	3.518e+07	<2e-16	***
factor(reports)14	-1.818e+15	7.232e+07	-2.513e+07	<2e-16	***
factor(income)0.49	-3.505e+15	9.536e+07	-3.675e+07	<2e-16	***
factor(income)1.2	-2.938e+15	8.547e+07	-3.438e+07	<2e-16	***
factor(income)1.32	5.084e+15	9.616e+07	5.287e+07	<2e-16	***
factor(income)1.434	-4.516e+15	9.700e+07	-4.656e+07	<2e-16	***
factor(income)1.45	-3.911e+15	9.676e+07	-4.041e+07	<2e-16	***
factor(income)1.5	4.459e+15	1.013e+08	4.403e+07	<2e-16	***
factor(income)1.51	6.147e+14	9.672e+07	6.355e+06	<2e-16	***
factor(income)1.511	1.281e+14	9.814e+07	1.305e+06	<2e-16	***
factor(income)1.515	-3.382e+15	9.615e+07	-3.518e+07	<2e-16	***
factor(income)1.53	4.504e+15	9.760e+07	4.615e+07	<2e-16	***
factor(income)1.5344	4.791e+15	9.810e+07	4.883e+07	<2e-16	***
factor(income)1.536	-3.224e+15	9.804e+07	-3.288e+07	<2e-16	***
factor(income)1.54	9.649e+14	9.731e+07	9.916e+06	<2e-16	***
factor(income)1.548	-3.421e+15	9.735e+07	-3.514e+07	<2e-16	***
factor(income)1.5548	-3.746e+15	9.599e+07	-3.902e+07	<2e-16	***
factor(income)1.56	6.059e+15	9.786e+07	6.192e+07	<2e-16	***
factor(income)1.566	1.060e+15	9.716e+07	1.091e+07	<2e-16	***
factor(income)1.5678	8.371e+14	9.630e+07	8.693e+06	<2e-16	***
factor(income)1.5896	1.129e+15	1.007e+08	1.121e+07	<2e-16	***
factor(income)1.59	-3.731e+15	9.793e+07	-3.809e+07	<2e-16	***
factor(income)1.6	5.763e+15	9.775e+07	5.896e+07	<2e-16	***
factor(income)1.62	1.103e+15	9.793e+07	1.127e+07	<2e-16	***
factor(income)1.6213	7.360e+14	1.018e+08	7.226e+06	<2e-16	***
factor(income)1.632	7.122e+14	9.684e+07	7.354e+06	<2e-16	***
factor(income)1.636	-3.294e+15	9.663e+07	-3.408e+07	<2e-16	***
factor(income)1.638	5.681e+15	9.761e+07	5.821e+07	<2e-16	***
factor(income)1.64	-2.966e+15	9.727e+07	-3.049e+07	<2e-16	***
factor(income)1.6417	2.797e+14	9.750e+07	2.869e+06	<2e-16	***

factor(income)1.65	7.683e+14	9.804e+07	7.837e+06	<2e-16	***
factor(income)1.66	6.853e+15	9.944e+07	6.891e+07	<2e-16	***
factor(income)1.672	-3.375e+15	9.702e+07	-3.479e+07	<2e-16	***
factor(income)1.6752	5.664e+15	9.725e+07	5.825e+07	<2e-16	***
factor(income)1.68	6.699e+14	9.820e+07	6.822e+06	<2e-16	***
factor(income)1.6949	4.124e+13	9.915e+07	4.159e+05	<2e-16	***
factor(income)1.7	5.009e+15	9.713e+07	5.157e+07	<2e-16	***
factor(income)1.7095	2.278e+15	9.900e+07	2.301e+07	<2e-16	***
factor(income)1.7123	5.216e+15	9.634e+07	5.414e+07	<2e-16	***
factor(income)1.725	-4.552e+14	1.009e+08	-4.510e+06	<2e-16	***
factor(income)1.73	-4.216e+15	9.736e+07	-4.331e+07	<2e-16	***
factor(income)1.7305	1.377e+15	9.948e+07	1.384e+07	<2e-16	***
factor(income)1.74	2.891e+14	9.818e+07	2.945e+06	<2e-16	***
factor(income)1.7472	6.707e+13	9.642e+07	6.956e+05	<2e-16	***
factor(income)1.75	1.035e+15	9.708e+07	1.066e+07	<2e-16	***
factor(income)1.76	4.622e+15	9.792e+07	4.720e+07	<2e-16	***
factor(income)1.77	-3.324e+15	9.689e+07	-3.430e+07	<2e-16	***
factor(income)1.78	-7.746e+14	8.507e+07	-9.106e+06	<2e-16	***
factor(income)1.79	9.985e+14	9.702e+07	1.029e+07	<2e-16	***
factor(income)1.8	6.022e+15	9.801e+07	6.145e+07	<2e-16	***
factor(income)1.8142	-1.486e+15	9.797e+07	-1.517e+07	<2e-16	***
factor(income)1.82	1.516e+15	9.768e+07	1.552e+07	<2e-16	***
factor(income)1.83	8.535e+14	9.824e+07	8.689e+06	<2e-16	***
factor(income)1.8339	-3.427e+15	9.604e+07	-3.568e+07	<2e-16	***
factor(income)1.84	-3.628e+15	9.781e+07	-3.709e+07	<2e-16	***
factor(income)1.8468	1.014e+15	9.743e+07	1.041e+07	<2e-16	***
factor(income)1.85	1.332e+15	9.763e+07	1.364e+07	<2e-16	***
factor(income)1.8504	-3.563e+15	9.682e+07	-3.680e+07	<2e-16	***
factor(income)1.86	7.168e+15	9.717e+07	7.376e+07	<2e-16	***
factor(income)1.8744	5.333e+15	9.699e+07	5.499e+07	<2e-16	***
factor(income)1.875	1.519e+15	9.742e+07	1.559e+07	<2e-16	***
factor(income)1.8769	2.089e+15	9.917e+07	2.106e+07	<2e-16	***
factor(income)1.8804	5.005e+15	9.712e+07	5.154e+07	<2e-16	***
factor(income)1.8829	-3.722e+14	9.691e+07	-3.841e+06	<2e-16	***
factor(income)1.89	2.070e+14	9.790e+07	2.115e+06	<2e-16	***
factor(income)1.9	2.929e+15	1.001e+08	2.927e+07	<2e-16	***
factor(income)1.908	5.876e+15	9.674e+07	6.074e+07	<2e-16	***
factor(income)1.92	1.047e+16	9.715e+07	1.078e+08	<2e-16	***
factor(income)1.9324	-1.875e+15	9.856e+07	-1.902e+07	<2e-16	***
factor(income)1.939	-3.492e+15	9.683e+07	-3.607e+07	<2e-16	***
factor(income)1.94	-7.059e+14	9.770e+07	-7.225e+06	<2e-16	***
factor(income)1.944	-3.548e+15	9.622e+07	-3.688e+07	<2e-16	***
factor(income)1.95	2.158e+14	9.741e+07	2.215e+06	<2e-16	***
factor(income)1.968	1.983e+15	9.854e+07	2.012e+07	<2e-16	***
factor(income)1.97	-6.289e+14	8.529e+07	-7.373e+06	<2e-16	***
factor(income)1.98	-4.102e+15	9.502e+07	-4.317e+07	<2e-16	***
factor(income)1.99	1.890e+15	9.929e+07	1.903e+07	<2e-16	***
factor(income)2	1.430e+15	9.856e+07	1.451e+07	<2e-16	***
factor(income)2.007	7.743e+14	9.613e+07	8.055e+06	<2e-16	***
factor(income)2.0237	-4.078e+15	9.659e+07	-4.222e+07	<2e-16	***
factor(income)2.0272	1.188e+15	9.626e+07	1.234e+07	<2e-16	***
factor(income)2.04	5.921e+15	9.938e+07	5.958e+07	<2e-16	***
factor(income)2.05	-3.119e+15	9.814e+07	-3.178e+07	<2e-16	***
factor(income)2.06	-2.890e+15	8.516e+07	-3.394e+07	<2e-16	***
factor(income)2.0676	-4.299e+14	9.863e+07	-4.359e+06	<2e-16	***
factor(income)2.07	-5.813e+14	8.524e+07	-6.820e+06	<2e-16	***
factor(income)2.08	5.513e+15	9.710e+07	5.677e+07	<2e-16	***
factor(income)2.1	5.209e+15	9.725e+07	5.357e+07	<2e-16	***
factor(income)2.12	8.355e+14	1.033e+08	8.088e+06	<2e-16	***
factor(income)2.13	8.786e+14	9.683e+07	9.074e+06	<2e-16	***
factor(income)2.136	-1.996e+14	9.730e+07	-2.051e+06	<2e-16	***
factor(income)2.1375	-3.189e+15	9.834e+07	-3.243e+07	<2e-16	***
factor(income)2.15	7.269e+15	9.767e+07	7.442e+07	<2e-16	***
factor(income)2.16	2.781e+14	9.724e+07	2.860e+06	<2e-16	***
factor(income)2.18	-2.351e+15	1.008e+08	-2.333e+07	<2e-16	***
factor(income)2.184	-7.069e+14	9.712e+07	-7.279e+06	<2e-16	***

factor(income)2.1888	2.369e+14	9.675e+07	2.449e+06	<2e-16	***
factor(income)2.19	6.690e+14	9.652e+07	6.931e+06	<2e-16	***
factor(income)2.2	1.655e+15	9.879e+07	1.676e+07	<2e-16	***
factor(income)2.205	4.250e+15	9.578e+07	4.437e+07	<2e-16	***
factor(income)2.216	5.209e+15	9.682e+07	5.380e+07	<2e-16	***
factor(income)2.22	-4.089e+15	9.521e+07	-4.295e+07	<2e-16	***
factor(income)2.2224	-8.099e+14	9.586e+07	-8.449e+06	<2e-16	***
factor(income)2.23	8.270e+14	9.682e+07	8.541e+06	<2e-16	***
factor(income)2.2348	5.865e+15	9.940e+07	5.901e+07	<2e-16	***
factor(income)2.236	-3.940e+15	1.035e+08	-3.805e+07	<2e-16	***
factor(income)2.2375	1.206e+15	9.736e+07	1.239e+07	<2e-16	***
factor(income)2.25	5.025e+15	9.729e+07	5.165e+07	<2e-16	***
factor(income)2.2593	7.284e+14	9.694e+07	7.514e+06	<2e-16	***
factor(income)2.275	5.207e+15	9.631e+07	5.407e+07	<2e-16	***
factor(income)2.28	-1.929e+14	9.789e+07	-1.971e+06	<2e-16	***
factor(income)2.2845	-3.724e+15	9.590e+07	-3.883e+07	<2e-16	***
factor(income)2.3	4.584e+14	9.626e+07	4.762e+06	<2e-16	***
factor(income)2.3004	-3.969e+15	9.846e+07	-4.031e+07	<2e-16	***
factor(income)2.304	1.305e+15	9.736e+07	1.341e+07	<2e-16	***
factor(income)2.308	4.075e+14	9.634e+07	4.229e+06	<2e-16	***
factor(income)2.3115	8.384e+14	9.752e+07	8.597e+06	<2e-16	***
factor(income)2.315	-2.687e+15	9.776e+07	-2.749e+07	<2e-16	***
factor(income)2.32	3.398e+14	9.752e+07	3.484e+06	<2e-16	***
factor(income)2.3204	-1.842e+15	9.880e+07	-1.864e+07	<2e-16	***
factor(income)2.34	4.464e+14	9.753e+07	4.577e+06	<2e-16	***
factor(income)2.35	3.992e+14	9.766e+07	4.087e+06	<2e-16	***
factor(income)2.3558	4.980e+15	9.595e+07	5.191e+07	<2e-16	***
factor(income)2.37	5.171e+15	9.654e+07	5.357e+07	<2e-16	***
factor(income)2.375	2.023e+15	9.948e+07	2.033e+07	<2e-16	***
factor(income)2.3779	1.122e+15	9.821e+07	1.143e+07	<2e-16	***
factor(income)2.385	4.161e+14	9.940e+07	4.186e+06	<2e-16	***
factor(income)2.4	2.237e+14	9.781e+07	2.287e+06	<2e-16	***
factor(income)2.408	1.226e+15	9.666e+07	1.269e+07	<2e-16	***
factor(income)2.4192	1.739e+14	9.688e+07	1.795e+06	<2e-16	***
factor(income)2.42	-3.366e+14	9.630e+07	-3.495e+06	<2e-16	***
factor(income)2.425	-2.033e+15	9.989e+07	-2.035e+07	<2e-16	***
factor(income)2.4304	-3.557e+14	9.710e+07	-3.663e+06	<2e-16	***
factor(income)2.4317	2.836e+15	9.977e+07	2.842e+07	<2e-16	***
factor(income)2.448	8.449e+14	9.797e+07	8.624e+06	<2e-16	***
factor(income)2.45	1.174e+15	9.886e+07	1.188e+07	<2e-16	***
factor(income)2.4585	4.298e+15	9.686e+07	4.438e+07	<2e-16	***
factor(income)2.46	1.670e+15	9.956e+07	1.677e+07	<2e-16	***
factor(income)2.466	-4.206e+15	1.000e+08	-4.206e+07	<2e-16	***
factor(income)2.4663	2.221e+14	9.711e+07	2.287e+06	<2e-16	***
factor(income)2.47	6.200e+15	9.698e+07	6.393e+07	<2e-16	***
factor(income)2.475	-2.236e+15	9.934e+07	-2.251e+07	<2e-16	***
factor(income)2.4752	6.281e+15	9.915e+07	6.335e+07	<2e-16	***
factor(income)2.48	1.010e+15	9.690e+07	1.042e+07	<2e-16	***
factor(income)2.4852	-3.926e+15	1.033e+08	-3.801e+07	<2e-16	***
factor(income)2.4875	-1.324e+15	9.760e+07	-1.357e+07	<2e-16	***
factor(income)2.5	-3.361e+14	9.784e+07	-3.436e+06	<2e-16	***
factor(income)2.51	3.356e+13	9.793e+07	3.426e+05	<2e-16	***
factor(income)2.512	1.795e+15	9.936e+07	1.806e+07	<2e-16	***
factor(income)2.52	5.371e+15	9.635e+07	5.574e+07	<2e-16	***
factor(income)2.5224	1.482e+15	9.715e+07	1.526e+07	<2e-16	***
factor(income)2.534	7.169e+14	9.700e+07	7.391e+06	<2e-16	***
factor(income)2.535	5.004e+15	9.673e+07	5.174e+07	<2e-16	***
factor(income)2.54	3.006e+15	9.697e+07	3.100e+07	<2e-16	***
factor(income)2.55	1.351e+15	9.696e+07	1.393e+07	<2e-16	***
factor(income)2.56	8.828e+15	9.679e+07	9.121e+07	<2e-16	***
factor(income)2.5685	4.809e+15	9.636e+07	4.991e+07	<2e-16	***
factor(income)2.58	1.055e+15	9.946e+07	1.061e+07	<2e-16	***
factor(income)2.585	5.938e+15	9.702e+07	6.121e+07	<2e-16	***
factor(income)2.59	8.540e+14	9.737e+07	8.770e+06	<2e-16	***
factor(income)2.6	3.547e+14	9.712e+07	3.652e+06	<2e-16	***
factor(income)2.616	-9.920e+13	9.698e+07	-1.023e+06	<2e-16	***

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factor(income)2.62      -2.526e+13  9.662e+07 -2.614e+05  <2e-16 ***
factor(income)2.625     -1.935e+15  1.016e+08 -1.904e+07  <2e-16 ***
factor(income)2.6372    -1.438e+15  9.596e+07 -1.499e+07  <2e-16 ***
factor(income)2.64      4.200e+15  9.785e+07  4.293e+07  <2e-16 ***
factor(income)2.65      5.301e+15  9.667e+07  5.484e+07  <2e-16 ***
factor(income)2.652     9.339e+14  9.594e+07  9.734e+06  <2e-16 ***
factor(income)2.6545    4.285e+15  9.677e+07  4.428e+07  <2e-16 ***
factor(income)2.656     1.261e+15  9.701e+07  1.300e+07  <2e-16 ***
factor(income)2.66      1.571e+15  9.649e+07  1.628e+07  <2e-16 ***
factor(income)2.6611    8.800e+14  9.775e+07  9.003e+06  <2e-16 ***
factor(income)2.67      1.722e+15  1.014e+08  1.699e+07  <2e-16 ***
factor(income)2.675     1.463e+15  9.718e+07  1.505e+07  <2e-16 ***
factor(income)2.6796    1.499e+15  9.743e+07  1.539e+07  <2e-16 ***
factor(income)2.68      8.928e+14  9.609e+07  9.291e+06  <2e-16 ***
factor(income)2.6875    1.289e+15  9.874e+07  1.306e+07  <2e-16 ***
factor(income)2.69      1.764e+15  9.727e+07  1.814e+07  <2e-16 ***
factor(income)2.7       5.385e+15  9.680e+07  5.563e+07  <2e-16 ***
factor(income)2.7161    -1.613e+15  1.059e+08 -1.524e+07  <2e-16 ***
factor(income)2.72      1.031e+14  9.659e+07  1.068e+06  <2e-16 ***
factor(income)2.7246    -3.133e+14  9.713e+07 -3.225e+06  <2e-16 ***
factor(income)2.725     -3.303e+14  9.715e+07 -3.400e+06  <2e-16 ***
factor(income)2.7268    -3.118e+15  9.689e+07 -3.218e+07  <2e-16 ***
factor(income)2.74      2.085e+15  9.773e+07  2.134e+07  <2e-16 ***
factor(income)2.7456    2.830e+14  9.762e+07  2.898e+06  <2e-16 ***
factor(income)2.7495    5.456e+14  9.813e+07  5.560e+06  <2e-16 ***
factor(income)2.75      4.833e+15  9.590e+07  5.039e+07  <2e-16 ***
factor(income)2.76      8.924e+14  9.678e+07  9.221e+06  <2e-16 ***

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[reached getOption("max.print") -- omitted 2391 rows]

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1404.57 on 1318 degrees of freedom
Residual deviance: 865.05 on 136 degrees of freedom
AIC: 3231

Number of Fisher Scoring iterations: 22

> exp(coef(model2))

(Intercept)	factor(reports)1	factor(reports)2
0	0	0
factor(reports)3	factor(reports)4	factor(reports)5
0	0	0
factor(reports)6	factor(reports)7	factor(reports)9
Inf	0	0
factor(reports)10	factor(reports)11	factor(reports)12
0	0	Inf
factor(reports)14	factor(income)0.49	factor(income)1.2
0	0	0
factor(income)1.32	factor(income)1.434	factor(income)1.45
Inf	0	0
factor(income)1.5	factor(income)1.51	factor(income)1.511
Inf	Inf	Inf
factor(income)1.515	factor(income)1.53	factor(income)1.5344
0	Inf	Inf
factor(income)1.536	factor(income)1.54	factor(income)1.548
0	Inf	0
factor(income)1.5548	factor(income)1.56	factor(income)1.566
0	Inf	Inf
factor(income)1.5678	factor(income)1.5896	factor(income)1.59
Inf	Inf	0
factor(income)1.6	factor(income)1.62	factor(income)1.6213
Inf	Inf	Inf
factor(income)1.632	factor(income)1.636	factor(income)1.638
Inf	0	Inf

factor(income)1.64	factor(income)1.6417	factor(income)1.65
0	Inf	Inf
factor(income)1.66	factor(income)1.672	factor(income)1.6752
Inf	0	Inf
factor(income)1.68	factor(income)1.6949	factor(income)1.7
Inf	Inf	Inf
factor(income)1.7095	factor(income)1.7123	factor(income)1.725
Inf	Inf	0
factor(income)1.73	factor(income)1.7305	factor(income)1.74
0	Inf	Inf
factor(income)1.7472	factor(income)1.75	factor(income)1.76
Inf	Inf	Inf
factor(income)1.77	factor(income)1.78	factor(income)1.79
0	0	Inf
factor(income)1.8	factor(income)1.8142	factor(income)1.82
Inf	0	Inf
factor(income)1.83	factor(income)1.8339	factor(income)1.84
Inf	0	0
factor(income)1.8468	factor(income)1.85	factor(income)1.8504
Inf	Inf	0
factor(income)1.86	factor(income)1.8744	factor(income)1.875
Inf	Inf	Inf
factor(income)1.8769	factor(income)1.8804	factor(income)1.8829
Inf	Inf	0
factor(income)1.89	factor(income)1.9	factor(income)1.908
Inf	Inf	Inf
factor(income)1.92	factor(income)1.9324	factor(income)1.939
Inf	0	0
factor(income)1.94	factor(income)1.944	factor(income)1.95
0	0	Inf
factor(income)1.968	factor(income)1.97	factor(income)1.98
Inf	0	0
factor(income)1.99	factor(income)2	factor(income)2.007
Inf	Inf	Inf
factor(income)2.0237	factor(income)2.0272	factor(income)2.04
0	Inf	Inf
factor(income)2.05	factor(income)2.06	factor(income)2.0676
0	0	0
factor(income)2.07	factor(income)2.08	factor(income)2.1
0	Inf	Inf
factor(income)2.12	factor(income)2.13	factor(income)2.136
Inf	Inf	0
factor(income)2.1375	factor(income)2.15	factor(income)2.16
0	Inf	Inf
factor(income)2.18	factor(income)2.184	factor(income)2.1888
0	0	Inf
factor(income)2.19	factor(income)2.2	factor(income)2.205
Inf	Inf	Inf
factor(income)2.216	factor(income)2.22	factor(income)2.2224
Inf	0	0
factor(income)2.23	factor(income)2.2348	factor(income)2.236
Inf	Inf	0
factor(income)2.2375	factor(income)2.25	factor(income)2.2593
Inf	Inf	Inf
factor(income)2.275	factor(income)2.28	factor(income)2.2845
Inf	0	0
factor(income)2.3	factor(income)2.3004	factor(income)2.304
Inf	0	Inf
factor(income)2.308	factor(income)2.3115	factor(income)2.315
Inf	Inf	0
factor(income)2.32	factor(income)2.3204	factor(income)2.34
Inf	0	Inf
factor(income)2.35	factor(income)2.3558	factor(income)2.37
Inf	Inf	Inf
factor(income)2.375	factor(income)2.3779	factor(income)2.385
Inf	Inf	Inf

factor(income)2.4	factor(income)2.408	factor(income)2.4192
Inf	Inf	Inf
factor(income)2.42	factor(income)2.425	factor(income)2.4304
0	0	0
factor(income)2.4317	factor(income)2.448	factor(income)2.45
Inf	Inf	Inf
factor(income)2.4585	factor(income)2.46	factor(income)2.466
Inf	Inf	0
factor(income)2.4663	factor(income)2.47	factor(income)2.475
Inf	Inf	0
factor(income)2.4752	factor(income)2.48	factor(income)2.4852
Inf	Inf	0
factor(income)2.4875	factor(income)2.5	factor(income)2.51
0	0	Inf
factor(income)2.512	factor(income)2.52	factor(income)2.5224
Inf	Inf	Inf
factor(income)2.534	factor(income)2.535	factor(income)2.54
Inf	Inf	Inf
factor(income)2.55	factor(income)2.56	factor(income)2.5685
Inf	Inf	Inf
factor(income)2.58	factor(income)2.585	factor(income)2.59
Inf	Inf	Inf
factor(income)2.6	factor(income)2.616	factor(income)2.62
Inf	0	0
factor(income)2.625	factor(income)2.6372	factor(income)2.64
0	0	Inf
factor(income)2.65	factor(income)2.652	factor(income)2.6545
Inf	Inf	Inf
factor(income)2.656	factor(income)2.66	factor(income)2.6611
Inf	Inf	Inf
factor(income)2.67	factor(income)2.675	factor(income)2.6796
Inf	Inf	Inf
factor(income)2.68	factor(income)2.6875	factor(income)2.69
Inf	Inf	Inf
factor(income)2.7	factor(income)2.7161	factor(income)2.72
Inf	0	Inf
factor(income)2.7246	factor(income)2.725	factor(income)2.7268
0	0	0
factor(income)2.74	factor(income)2.7456	factor(income)2.7495
Inf	Inf	Inf
factor(income)2.75	factor(income)2.76	factor(income)2.77
Inf	Inf	Inf
factor(income)2.78	factor(income)2.7811	factor(income)2.7885
0	Inf	0
factor(income)2.79	factor(income)2.8	factor(income)2.8055
Inf	Inf	0
factor(income)2.8065	factor(income)2.82	factor(income)2.825
Inf	Inf	Inf
factor(income)2.8463	factor(income)2.85	factor(income)2.8542
0	0	Inf
factor(income)2.86	factor(income)2.8725	factor(income)2.88
Inf	0	Inf
factor(income)2.8896	factor(income)2.9	factor(income)2.938
Inf	Inf	Inf
factor(income)2.95	factor(income)2.9623	factor(income)2.97
Inf	Inf	Inf
factor(income)2.98	factor(income)3	factor(income)3.04
Inf	Inf	Inf
factor(income)3.05	factor(income)3.06	factor(income)3.067
Inf	Inf	Inf
factor(income)3.074	factor(income)3.095	factor(income)3.1
Inf	0	Inf
factor(income)3.1131	factor(income)3.1144	factor(income)3.115
0	Inf	Inf
factor(income)3.12	factor(income)3.1475	factor(income)3.15
Inf	Inf	Inf

factor(income)3.1532	factor(income)3.1782	factor(income)3.18
Inf	Inf	Inf
factor(income)3.1894	factor(income)3.192	factor(income)3.2
Inf	0	Inf
factor(income)3.224	factor(income)3.235	factor(income)3.2388
Inf	Inf	0
factor(income)3.24	factor(income)3.248	factor(income)3.25
Inf	Inf	Inf
factor(income)3.26	factor(income)3.2604	factor(income)3.2618
Inf	Inf	Inf
factor(income)3.2628	factor(income)3.264	factor(income)3.27
Inf	Inf	Inf
factor(income)3.2875	factor(income)3.2905	factor(income)3.3
Inf	Inf	Inf
factor(income)3.3026	factor(income)3.305	factor(income)3.328
Inf	Inf	Inf
factor(income)3.35	factor(income)3.36	factor(income)3.374
Inf	Inf	0
factor(income)3.3748	factor(income)3.38	factor(income)3.3984
Inf	0	Inf
factor(income)3.4	factor(income)3.4064	factor(income)3.41
Inf	Inf	Inf
factor(income)3.42	factor(income)3.4224	factor(income)3.48
Inf	Inf	0
factor(income)3.4838	factor(income)3.5	factor(income)3.5091
Inf	Inf	Inf
factor(income)3.52	factor(income)3.54	factor(income)3.5412
Inf	Inf	Inf
factor(income)3.56	factor(income)3.5606	factor(income)3.57
Inf	Inf	0
factor(income)3.58	factor(income)3.5822	factor(income)3.5995
Inf	Inf	0
factor(income)3.6	factor(income)3.6208	factor(income)3.624
Inf	Inf	0
factor(income)3.625	factor(income)3.64	factor(income)3.65
Inf	Inf	Inf
factor(income)3.67	factor(income)3.68	factor(income)3.7
Inf	0	Inf
factor(income)3.7099	factor(income)3.73	factor(income)3.75
Inf	Inf	Inf
factor(income)3.8	factor(income)3.805	factor(income)3.82
Inf	Inf	Inf
factor(income)3.836	factor(income)3.84	factor(income)3.8425
Inf	Inf	Inf
factor(income)3.85	factor(income)3.86	factor(income)3.9
Inf	Inf	Inf
factor(income)3.92	factor(income)3.9495	factor(income)3.95
Inf	Inf	Inf
factor(income)3.96	factor(income)3.9946	factor(income)4
Inf	Inf	Inf
factor(income)4.01	factor(income)4.0104	factor(income)4.0128
Inf	0	0
factor(income)4.0188	factor(income)4.0248	factor(income)4.03
Inf	0	Inf
factor(income)4.04	factor(income)4.07	factor(income)4.075
0	0	Inf
factor(income)4.1	factor(income)4.1125	factor(income)4.14
Inf	0	0
factor(income)4.15	factor(income)4.16	factor(income)4.18
Inf	0	0
factor(income)4.2	factor(income)4.22	factor(income)4.232
Inf	Inf	Inf
factor(income)4.288	factor(income)4.3	factor(income)4.32
Inf	0	Inf
factor(income)4.35	factor(income)4.3681	factor(income)4.375
0	Inf	Inf

factor(income)4.38	factor(income)4.386	factor(income)4.4
Inf	0	Inf
factor(income)4.44	factor(income)4.467	factor(income)4.4692
0	Inf	0
factor(income)4.475	factor(income)4.5	factor(income)4.506
0	0	Inf
factor(income)4.52	factor(income)4.53	factor(income)4.55
Inf	Inf	Inf
factor(income)4.56	factor(income)4.566	factor(income)4.58
Inf	Inf	Inf
factor(income)4.6	factor(income)4.65	factor(income)4.68
Inf	0	Inf
factor(income)4.7	factor(income)4.7232	factor(income)4.74
Inf	Inf	0
factor(income)4.77	factor(income)4.8	factor(income)4.81
Inf	Inf	0
factor(income)4.815	factor(income)4.85	factor(income)4.9
0	Inf	0
factor(income)4.92	factor(income)4.96	factor(income)4.9875
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factor(income)5	factor(income)5.04	factor(income)5.05
Inf	Inf	0
factor(income)5.1	factor(income)5.112	factor(income)5.14
Inf	Inf	0
factor(income)5.16	factor(income)5.2	factor(income)5.3
0	Inf	0
factor(income)5.32	factor(income)5.3726	factor(income)5.4
Inf	0	Inf
factor(income)5.43	factor(income)5.47	factor(income)5.48
Inf	Inf	Inf
factor(income)5.49	factor(income)5.5	factor(income)5.5689
Inf	Inf	Inf
factor(income)5.6	factor(income)5.6335	factor(income)5.6965
Inf	0	0
factor(income)5.7	factor(income)5.77	factor(income)5.8
0	0	0
factor(income)5.9	factor(income)5.905	factor(income)5.92
0	Inf	Inf
factor(income)5.97	factor(income)6	factor(income)6.1
0	Inf	Inf
factor(income)6.1064	factor(income)6.2	factor(income)6.3
Inf	0	Inf
factor(income)6.4532	factor(income)6.5	factor(income)6.6
0	Inf	Inf
factor(income)6.7	factor(income)6.72	factor(income)6.8
0	Inf	Inf
factor(income)6.825	factor(income)6.888	factor(income)6.9
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factor(income)7.2904	factor(income)7.35	factor(income)7.5
Inf	Inf	Inf
factor(income)7.572	factor(income)7.6	factor(income)7.701
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factor(income)8.4	factor(income)8.94	factor(income)9
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factor(income)9.2	factor(income)9.4	factor(income)9.7867
Inf	0	Inf
factor(income)9.9999	factor(income)10	factor(income)10.032
Inf	0	Inf

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Inf	Inf	Inf
factor(income)10.9999	factor(income)11	factor(income)11.9999
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0	NA	0
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0	NA	NA
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0	0	NA
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0	Inf	Inf
factor(share)0.01680412	factor(share)0.016826	factor(share)0.01688936
NA	0	NA
factor(share)0.01700675	factor(share)0.01701942	factor(share)0.01710906
0	0	0
factor(share)0.017262	factor(share)0.01756572	factor(share)0.01771837
0	NA	0
factor(share)0.01785056	factor(share)0.01792304	factor(share)0.01795825
0	0	0
factor(share)0.01799908	factor(share)0.01804822	factor(share)0.01830487
NA	Inf	0
factor(share)0.01847894	factor(share)0.01855033	factor(share)0.01856679
0	0	NA
factor(share)0.019072	factor(share)0.0193976	factor(share)0.01952256
0	Inf	NA
factor(share)0.01972267	factor(share)0.01978	factor(share)0.01989944
0	0	0
factor(share)0.02006617	factor(share)0.02011975	factor(share)0.02048182
NA	0	0
factor(share)0.0204978	factor(share)0.02055556	factor(share)0.0205616
Inf	Inf	0
factor(share)0.020658	factor(share)0.02071958	factor(share)0.02089871
0	Inf	NA
factor(share)0.0210496	factor(share)0.02107955	factor(share)0.02121324
Inf	NA	0
factor(share)0.02122066	factor(share)0.02125	factor(share)0.02130902
NA	Inf	0
factor(share)0.02146354	factor(share)0.02147727	factor(share)0.02165545
0	0	NA
factor(share)0.02186308	factor(share)0.02189943	factor(share)0.0219424
NA	0	Inf
factor(share)0.02238596	factor(share)0.02240434	factor(share)0.02268351
Inf	0	NA
factor(share)0.0229845	factor(share)0.02302267	factor(share)0.023269
Inf	0	Inf
factor(share)0.02353625	factor(share)0.02358028	factor(share)0.02359458
0	Inf	Inf
factor(share)0.02366667	factor(share)0.02382222	factor(share)0.02392328
Inf	0	Inf
factor(share)0.02411576	factor(share)0.02445829	factor(share)0.02467697
0	Inf	NA
factor(share)0.02476569	factor(share)0.02479182	factor(share)0.02481051
NA	Inf	NA
factor(share)0.02482904	factor(share)0.0249386	factor(share)0.02494458
NA	Inf	Inf
factor(share)0.02501619	factor(share)0.02505764	factor(share)0.02505766
Inf	NA	NA
factor(share)0.0251939	factor(share)0.02528568	factor(share)0.02532014
NA	NA	Inf
factor(share)0.02533895	factor(share)0.02563117	factor(share)0.02572685
NA	0	Inf

factor(share)0.02586333	factor(share)0.02599111	factor(share)0.02623077
0	0	Inf
factor(share)0.02651261	factor(share)0.02655333	factor(share)0.02659568
0	Inf	0
factor(share)0.02667368	factor(share)0.02673974	factor(share)0.02690671
0	0	NA
factor(share)0.026928	factor(share)0.026998	factor(share)0.02724
0	0	0
factor(share)0.02751957	factor(share)0.02812798	factor(share)0.02820012
Inf	NA	NA
factor(share)0.02842812	factor(share)0.02855478	factor(share)0.02862341
NA	Inf	NA
factor(share)0.02882272	factor(share)0.0289768	factor(share)0.02909975
NA	Inf	NA
factor(share)0.02910716	factor(share)0.02919232	factor(share)0.02921738
NA	NA	Inf
factor(share)0.029469	factor(share)0.02962699	factor(share)0.02974648
0	NA	NA
factor(share)0.0298332	factor(share)0.02984697	factor(share)0.03015786
Inf	NA	Inf
factor(share)0.03023229	factor(share)0.03028024	factor(share)0.03075632
Inf	NA	NA
factor(share)0.030976	factor(share)0.03098154	factor(share)0.03098167
0	Inf	0
factor(share)0.03099	factor(share)0.03100344	factor(share)0.03101882
Inf	0	0
factor(share)0.03113791	factor(share)0.03124	factor(share)0.03137474
NA	0	Inf
factor(share)0.03142812	factor(share)0.03145	factor(share)0.03147661
NA	Inf	0
factor(share)0.03148378	factor(share)0.03150603	factor(share)0.0315875
NA	NA	Inf
factor(share)0.0316508	factor(share)0.03186978	factor(share)0.03187233
0	0	0
factor(share)0.03192233	factor(share)0.03221615	factor(share)0.03242008
0	0	NA
factor(share)0.03244491	factor(share)0.032497	factor(share)0.03251895
0	0	Inf
factor(share)0.03296432	factor(share)0.03306483	factor(share)0.03311243
0	Inf	0
factor(share)0.03314945	factor(share)0.03320618	factor(share)0.03326991
Inf	NA	NA
factor(share)0.0335	factor(share)0.03337825	factor(share)0.03396795
0	Inf	Inf
factor(share)0.03404134	factor(share)0.03419023	factor(share)0.03421425
NA	Inf	0
factor(share)0.03427907	factor(share)0.03435875	factor(share)0.03458607
0	Inf	0
factor(share)0.03474402	factor(share)0.03482019	factor(share)0.03489609
NA	NA	Inf
factor(share)0.03496332	factor(share)0.03496943	factor(share)0.03501814
Inf	0	Inf
factor(share)0.03501987	factor(share)0.03514566	factor(share)0.03532235
0	NA	0
factor(share)0.03544926	factor(share)0.03545144	factor(share)0.03546543
Inf	Inf	Inf
factor(share)0.03560869	factor(share)0.0356228	factor(share)0.03591921
Inf	Inf	Inf
factor(share)0.03620279	factor(share)0.03635741	factor(share)0.03642203
Inf	Inf	0
factor(share)0.03650327	factor(share)0.03666654	factor(share)0.03697246
NA	Inf	Inf
factor(share)0.03704	factor(share)0.03709175	factor(share)0.03716286
Inf	0	0
factor(share)0.03722216	factor(share)0.03733385	factor(share)0.03736278
0	Inf	NA

```

factor(share)0.03792664    factor(share)0.03806583    factor(share)0.03811111
      NA                    0                    0
factor(share)0.03813821    factor(share)0.03820546    factor(share)0.03821515
      Inf                    Inf                    NA
factor(share)0.03821552    factor(share)0.03838103    factor(share)0.038431
      0                    Inf                    Inf
      factor(share)0.038453    factor(share)0.03858522    factor(share)0.03867167
      0                    Inf                    Inf
factor(share)0.03875531    factor(share)0.03879551    factor(share)0.03882722
      NA                    0                    0
factor(share)0.03886773    factor(share)0.03904502    factor(share)0.03930543
      NA                    NA                    Inf
factor(share)0.03947758    factor(share)0.039573      factor(share)0.03977939
      0                    0                    0
factor(share)0.03980107    factor(share)0.03987022    factor(share)0.04004043
      0                    Inf                    Inf
factor(share)0.04042523    factor(share)0.04065079    factor(share)0.04070939
      NA                    Inf                    Inf
factor(share)0.04091464    factor(share)0.04106146    factor(share)0.04111704
      NA                    NA                    0
factor(share)0.04113469    factor(share)0.04128572    factor(share)0.04137513
      Inf                    0                    0
factor(share)0.04148197    factor(share)0.0418539      factor(share)0.042129
      NA                    NA                    0
factor(share)0.04216182    factor(share)0.04229      factor(share)0.04245641
      0                    Inf                    0
factor(share)0.04264756    factor(share)0.04285106    factor(share)0.04295223
      Inf                    Inf                    NA
factor(share)0.04339778    factor(share)0.04341593    factor(share)0.04344189
      0                    NA                    Inf
factor(share)0.04356111    factor(share)0.04364765    factor(share)0.04364769
      0                    NA                    0
factor(share)0.04372321    factor(share)0.04374329    factor(share)0.04400998
      Inf                    NA                    NA
factor(share)0.04420053    factor(share)0.04429271    factor(share)0.04437958
      NA                    NA                    0
      factor(share)0.0444384    factor(share)0.04462218    factor(share)0.04465253
      Inf                    NA                    NA
factor(share)0.04474897    factor(share)0.0448939      factor(share)0.0449081
      NA                    NA                    Inf
factor(share)0.04493018    factor(share)0.04509      factor(share)0.04510837
      0                    0                    Inf
factor(share)0.04514543    factor(share)0.0452946    factor(share)0.04541571
      0                    0                    Inf
factor(share)0.04542718    factor(share)0.04545781    factor(share)0.045469
      0                    0                    0
      factor(share)0.0457034
      Inf
[ reached getOption("max.print") -- omitted 1591 entries ]
> prob1 <- predict(model2,type = "response")
> final1 <- cbind(CreditCard,prob1)
> confusion_matrix1 <- table(prob1>0.5,CreditCard$card)
> table(prob1>0.5)

FALSE  TRUE
 298   1021
> confusion_matrix1

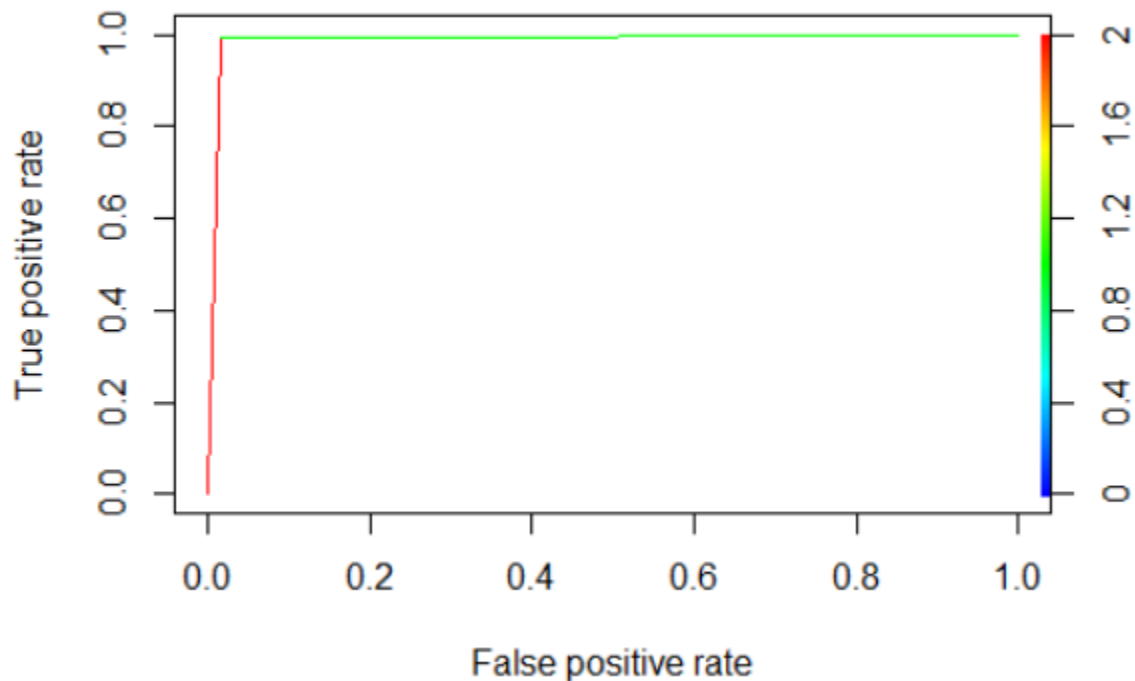
      0      1
FALSE 291    7
TRUE   5   1016
> Accuracy2 <- sum(diag(confusion_matrix1)/sum(confusion_matrix1))
> Accuracy2
[1] 0.9909022
> threshold=0.5
> predicted_values<-ifelse(predict(model2,type="response")>threshold,1,0)

```

```

> actual_values<-CreditCard$card
> conf_matrix<-table(predicted_values,actual_values)
> conf_matrix
      actual_values
predicted_values 0    1
0      291    7
1       5  1016
> library(caret)
> specificity(conf_matrix)
[1] 0.9931574
> sensitivity(conf_matrix)
[1] 0.9831081
> predicted_values1<-ifelse(predict(CreditCard_model,type="response")>threshold,
1,0)
> actual_values1<-CreditCard$card
> conf_matrix1<-table(predicted_values1,actual_values1)
> conf_matrix1
      actual_values1
predicted_values1 0    1
0      141    6
1      155  1017
> library(caret)
> specificity(conf_matrix1)
[1] 0.9941349
> sensitivity(conf_matrix1)
[1] 0.4763514
> ##Roc curve
> library(ROCR)
> rocpred <- prediction(prob1,CreditCard$card)
> rocperf <- performance(rocpred,"tpr","fpr")
> plot(rocperf,colorize=T,text.adj=c(-0.2,1.7))

```



Conclusion- Model accuracy = 0.9909022 that is 99.09%