3333

library(e1071) library(reshape2) library(caret) set.seed(1234) UniversalBank<-read.csv('UniversalBank.csv')
#factor Personal.Loan,online and CreditCard UniversalBank$Personal.Loan = as.factor(UniversalBank$Personal.Loan)
UniversalBank$Online = as.factor(UniversalBank$Online) UniversalBank$CreditCard = as.factor(UniversalBank$CreditCa
#40% to validation test_data = createDataPartition(UniversalBank$Personal.Loan,p=0.4, list=FALSE)
#a pivot table dcast(UniversalBank[-as.numeric(test_data),],CreditCard+Personal.Loan~Online)

#b 54/(490+54)=0.09926471

c

#Loan (rows) Online (columns) dcast(UniversalBank[-as.numeric(test_data),],Personal.Loan~Online)
#Loan (rows)credit card (columns) dcast(UniversalBank[-as.numeric(test_data),],Personal.Loan~CreditCard)

#d # 1 95/(193+95)=0.3298611 # 2 179/(179+109)=0.6215278 # 3 (179+109)/(179+109+1091+1621)=0.096
#OR (193+95)/(193+95+1914+798)=0.096 # 4 798/(1914+798)=0.2942478 # 5 1621/(1091+1621)=0.5977139
6 (1914+798)/(1914+798+193+95)=0.904

#e(1*2*3)/(1*2*3+4*5*6) (0.3298611*0.6215278*0.096)/((0.3298611*0.6215278*0.096)+(0.2942478*0.5977139*0.904))=0.1101546

#f b is best because e was calculated by naive Bayes for credit card and online was mutual independence but credit card and online was not mutual independence. naive Bayes was based on Multi - conditional classification algorithm it assume different condition was mutual independence. for b it was directly calculated by number so b accurate is more than e. # g all entries in this table are needed for computing P(Loan = 1 | CC = 1, Online = 1), is was calculate by (1*2*3)/(1*2*3+4*5*6). # to prevent 0 and 1 to be numeric so make a dataframe call X and all the variable to be factor. X<-data.frame(CC=factor(UniversalBank$CreditCard[-as.numeric($test_data$)]), $Online$ = $factor(UniversalBank$Online[-as.numeric(test_data)]),Loan=factor(UniversalBank$Personal.Loan[-as.numeric(test_data)])) #naive bayes mod<-naiveBayes(Loan~CC+Online,data=X)

predict(mod,data.frame(Online=as.factor(1),CC=as.factor(1)),type='raw')

#output is 0(0.8898454) 1(0.1101546) tha answer is same with question E.