Data\_Mining.R

riserate

Mon May 29 18:28:59 2017

# Task 1  
  
# General Objective  
# To find the best interesting sequential rules  
# Data sets  
# • diab\_trans.data  
# • http://mlr.cs.umass.edu/ml/datasets/Diabetes does not exist  
# https://archive.ics.uci.edu/ml/datasets/diabetes correct location  
  
#Needed libraries  
library(arules)

## Loading required package: Matrix

##   
## Attaching package: 'arules'

## The following objects are masked from 'package:base':  
##   
## abbreviate, write

library(arulesSequences)  
  
#read in the data  
diab.df <- read.csv("diab\_trans.data", header=TRUE, stringsAsFactors = FALSE)  
  
diab.df <- diab.df[complete.cases(diab.df),]  
  
#define the column names  
colnames(diab.df) <- c("ID", "time", "eventID", "value")  
  
#eventID formatting e.g. id\_65 to 65  
eventID\_to\_int <- function(frame) {  
 apply(frame, 1, function(x) strtoi(unlist(strsplit(x[3], "\_"))[2]))  
}  
diab.df$eventID <- eventID\_to\_int(diab.df)  
  
# clean the data for use, throw out data we don't need  
# events where id < 64 we don't want not transactional data items, 65+ we need. We want to create baskets for the events that do have values  
# so that similar values are grouped together during rule mining.  
num\_baskets <- 3  
out.df <- data.frame()  
for (id in unique(diab.df$eventID)) {  
 cat("processing eventID: ", id, "\n")  
 baskets <- list(dim=(num\_baskets+1))  
 if(id >= 65) {  
 next  
 }  
  
 sorted\_values <- sort(diab.df$value[diab.df$eventID == id])  
 len <- length(sorted\_values)  
 step <- len / num\_baskets  
 for (j in 1:(num\_baskets)) {  
 baskets <- append(baskets, sorted\_values[j \* step])  
 }  
 baskets <- append(baskets, len)  
  
 sub <- subset(diab.df, eventID == id)  
 for (row in 1:nrow(sub)) {  
 s <- sub[row,]  
 for (k in 1:(num\_baskets)) {  
 if ((s[4] >= baskets[k]) && (s[4] <= baskets[k+1])) {  
 mod\_sample <- s  
 mod\_sample[3] = 100 \* s[3] + k # change event ID  
 out.df <- rbind(out.df, mod\_sample)  
 break  
 }  
 }  
 }  
}

## processing eventID: 58   
## processing eventID: 33   
## processing eventID: 34   
## processing eventID: 62   
## processing eventID: 48   
## processing eventID: 65   
## processing eventID: 60   
## processing eventID: 35   
## processing eventID: 56   
## processing eventID: 64   
## processing eventID: 61   
## processing eventID: 67   
## processing eventID: 63   
## processing eventID: 57   
## processing eventID: 72   
## processing eventID: 68   
## processing eventID: 69   
## processing eventID: 59   
## processing eventID: 71   
## processing eventID: 66   
## processing eventID: 70   
## processing eventID: 36

unique(out.df$eventID)

## [1] 5801 5803 5802 3303 3302 3301 3402 3403 3401 6202 6203 6201 4801 4803  
## [15] 4802 6003 6001 6002 3501 3502 3503 5601 5602 5603 6402 6401 6403 6101  
## [29] 6102 6103 6302 6301 6303 5702 5701 5703 5903 5901 5902 3601

data.df <- out.df  
data.df <- rbind(data.df, subset(diab.df, eventID > 64))  
  
head(subset(data.df, eventID==5803))

## ID time eventID value  
## 7 1 96852901 5803 216  
## 13 1 96938701 5803 257  
## 18 1 97026721 5803 239  
## 39 1 97293781 5803 259  
## 84 1 97804081 5803 305  
## 118 1 98235781 5803 251

data.df.sorted <- data.df[order(data.df["ID"], data.df["time"]),]  
  
write.table(data.df.sorted, "diab\_baskets.data", sep = ",", row.names = FALSE, col.names = FALSE)  
write.table(data.df.sorted[,-c(4)], "diab\_baskets\_novalues.data", sep = ",", row.names = FALSE, col.names = FALSE)  
  
diabSeq <- read\_baskets(con = "diab\_baskets\_novalues.data", sep =",", info = c("sequenceID","eventID"))  
  
seqParam = new ("SPparameter",support = 0.5, maxsize = 4, mingap=600, maxgap =172800, maxlen = 3 )  
patSeq= cspade(diabSeq,seqParam, control = list(verbose = TRUE, tidLists = FALSE, summary= TRUE))

##   
## parameter specification:  
## support : 0.5  
## maxsize : 4  
## maxlen : 3  
## mingap : 600  
## maxgap : 172800  
##   
## algorithmic control:  
## bfstype : FALSE  
## verbose : TRUE  
## summary : TRUE  
## tidLists : FALSE  
##   
## preprocessing ... 1 partition(s), 0.48 MB [0.051s]  
## mining transactions ... 0.03 MB [0.039s]  
## reading sequences ... [0.097s]  
##   
## total elapsed time: 0.187s

#set the confidence at 80% but can be increased to 90%  
seqRules = ruleInduction(patSeq,confidence = 0.8)  
  
length(seqRules)

## [1] 531

#Summary of the sequence rules  
summary(seqRules)

## set of 531 sequencerules with  
##   
## rule size distribution (lhs + rhs)  
## sizes  
## 2 3   
## 99 432   
##   
## rule length distribution (lhs + rhs)  
## lengths  
## 2 3   
## 137 394   
##   
## summary of quality measures:  
## support confidence lift   
## Min. :0.5000 Min. :0.8000 Min. :0.8949   
## 1st Qu.:0.5758 1st Qu.:0.8265 1st Qu.:0.9483   
## Median :0.6364 Median :0.8545 Median :0.9859   
## Mean :0.6368 Mean :0.8623 Mean :0.9941   
## 3rd Qu.:0.6970 3rd Qu.:0.8936 3rd Qu.:1.0342   
## Max. :0.8333 Max. :0.9821 Max. :1.5178   
##   
## mining info:  
## data ntransactions nsequences support confidence  
## diabSeq 22491 66 0.5 0.8

#inspect the firs 100 rules  
inspect(head(seqRules,100))

## lhs rhs support confidence lift   
## 1 <{3302}> => <{6203}> 0.7575758 0.8928571 1.0160099   
## 2 <{3303}> => <{6203}> 0.5000000 0.8048780 0.9158957   
## 3 <{5801}> => <{6203}> 0.7575758 0.8474576 0.9643483   
## 4 <{5802}> => <{6203}> 0.8181818 0.9152542 1.0414962   
## 5 <{5803}> => <{6203}> 0.8333333 0.9821429 1.1176108   
## 6 <{6001}> => <{6203}> 0.7727273 0.9272727 1.0551724   
## 7 <{6002}> => <{6203}> 0.7272727 0.9056604 1.0305791   
## 8 <{6003}> => <{6203}> 0.6818182 0.8490566 0.9661679   
## 9 <{6201}> => <{6203}> 0.8333333 0.9322034 1.0607832   
## 10 <{6202}> => <{6203}> 0.7121212 0.8103448 0.9221165   
## 11 <{6203}> => <{6203}> 0.7575758 0.8620690 0.9809750   
## 12 <{6401}> => <{6203}> 0.5454545 0.9000000 1.0241379   
## 13 <{5803},   
## {6203}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 14 <{6003},   
## {6203}> => <{6203}> 0.5757576 0.8444444 0.9609195   
## 15 <{6201},   
## {6203}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 16 <{6203},   
## {6203}> => <{6203}> 0.6212121 0.8200000 0.9331034   
## 17 <{3302},   
## {6202}> => <{6203}> 0.5606061 0.8043478 0.9152924   
## 18 <{5802},   
## {6202}> => <{6203}> 0.6212121 0.8039216 0.9148073   
## 19 <{6001},   
## {6202}> => <{6203}> 0.5606061 0.8222222 0.9356322   
## 20 <{3302},   
## {6201}> => <{6203}> 0.6060606 0.8510638 0.9684519   
## 21 <{5801},   
## {6201}> => <{6203}> 0.6969697 0.8679245 0.9876383   
## 22 <{5802},   
## {6201}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 23 <{5803},   
## {6003}> => <{6203}> 0.5909091 0.8297872 0.9442406   
## 24 <{6003},   
## {6003}> => <{6203}> 0.5000000 0.8048780 0.9158957   
## 25 <{3302},   
## {6002}> => <{6203}> 0.5757576 0.8636364 0.9827586   
## 26 <{5803},   
## {6002}> => <{6203}> 0.5757576 0.8444444 0.9609195   
## 27 <{6202},   
## {6002}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 28 <{3302},   
## {6001}> => <{6203}> 0.5454545 0.8780488 0.9991590   
## 29 <{5801},   
## {6001}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 30 <{5802},   
## {6001}> => <{6203}> 0.6969697 0.9019608 1.0263692   
## 31 <{5803},   
## {6001}> => <{6203}> 0.6060606 0.8510638 0.9684519   
## 32 <{6201},   
## {6001}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 33 <{6202},   
## {6001}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 34 <{3301},   
## {5803}> => <{6203}> 0.5606061 0.8222222 0.9356322   
## 35 <{3302},   
## {5803}> => <{6203}> 0.6969697 0.9200000 1.0468966   
## 36 <{5801},   
## {5803}> => <{6203}> 0.6969697 0.8679245 0.9876383   
## 37 <{5802},   
## {5803}> => <{6203}> 0.6666667 0.8148148 0.9272031   
## 38 <{5803},   
## {5803}> => <{6203}> 0.7121212 0.8545455 0.9724138   
## 39 <{6001},   
## {5803}> => <{6203}> 0.6969697 0.9387755 1.0682618   
## 40 <{6201},   
## {5803}> => <{6203}> 0.7272727 0.8727273 0.9931034   
## 41 <{6203},   
## {5803}> => <{6203}> 0.6818182 0.8333333 0.9482759   
## 42 <{3302},   
## {5802}> => <{6203}> 0.6212121 0.8541667 0.9719828   
## 43 <{5803},   
## {5802}> => <{6203}> 0.7121212 0.8545455 0.9724138   
## 44 <{6002},   
## {5802}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 45 <{6201},   
## {5802}> => <{6203}> 0.6969697 0.8518519 0.9693487   
## 46 <{6202},   
## {5802}> => <{6203}> 0.6363636 0.8235294 0.9371197   
## 47 <{5801},   
## {5801}> => <{6203}> 0.6060606 0.8000000 0.9103448   
## 48 <{5802},   
## {5801}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 49 <{6202},   
## {5801}> => <{6203}> 0.6363636 0.8235294 0.9371197   
## 50 <{3302},   
## {3302}> => <{6203}> 0.6212121 0.8039216 0.9148073   
## 51 <{5801},   
## {3302}> => <{6203}> 0.6060606 0.8333333 0.9482759   
## 52 <{5802},   
## {3302}> => <{6203}> 0.6363636 0.8400000 0.9558621   
## 53 <{5803},   
## {3302}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 54 <{6001},   
## {3302}> => <{6203}> 0.5606061 0.8409091 0.9568966   
## 55 <{6002},   
## {3302}> => <{6203}> 0.5151515 0.8095238 0.9211823   
## 56 <{6003},   
## {3302}> => <{6203}> 0.5454545 0.8571429 0.9753695   
## 57 <{6201},   
## {3302}> => <{6203}> 0.6515152 0.8958333 1.0193966   
## 58 <{6202},   
## {3302}> => <{6203}> 0.5757576 0.8260870 0.9400300   
## 59 <{3302},   
## {3301}> => <{6203}> 0.5757576 0.8085106 0.9200293   
## 60 <{6001},   
## {3301}> => <{6203}> 0.5151515 0.8095238 0.9211823   
## 61 <{6203},   
## {3301}> => <{6203}> 0.5303030 0.8750000 0.9956897   
## 62 <{3302}> => <{6202}> 0.6969697 0.8214286 0.9347291   
## 63 <{5801}> => <{6202}> 0.7575758 0.8474576 0.9643483   
## 64 <{5802}> => <{6202}> 0.7727273 0.8644068 0.9836353   
## 65 <{5803}> => <{6202}> 0.7575758 0.8928571 1.0160099   
## 66 <{6001}> => <{6202}> 0.6818182 0.8181818 0.9310345   
## 67 <{6002}> => <{6202}> 0.6818182 0.8490566 0.9661679   
## 68 <{6003}> => <{6202}> 0.6515152 0.8113208 0.9232271   
## 69 <{6201}> => <{6202}> 0.7575758 0.8474576 0.9643483   
## 70 <{6203}> => <{6202}> 0.7575758 0.8620690 0.9809750   
## 71 <{6202},   
## {6003}> => <{6202}> 0.5000000 0.8048780 0.9158957   
## 72 <{6203},   
## {6002}> => <{6202}> 0.5454545 0.8000000 0.9103448   
## 73 <{6202},   
## {6001}> => <{6202}> 0.5454545 0.8181818 0.9310345   
## 74 <{3302}> => <{6201}> 0.7121212 0.8392857 0.9388620   
## 75 <{3303}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 76 <{5801}> => <{6201}> 0.8030303 0.8983051 1.0048837   
## 77 <{5802}> => <{6201}> 0.8333333 0.9322034 1.0428038   
## 78 <{5803}> => <{6201}> 0.8030303 0.9464286 1.0587167   
## 79 <{6001}> => <{6201}> 0.7878788 0.9454545 1.0576271   
## 80 <{6002}> => <{6201}> 0.7121212 0.8867925 0.9920051   
## 81 <{6003}> => <{6201}> 0.7424242 0.9245283 1.0342181   
## 82 <{6201}> => <{6201}> 0.7878788 0.8813559 0.9859236   
## 83 <{6202}> => <{6201}> 0.7727273 0.8793103 0.9836353   
## 84 <{6203}> => <{6201}> 0.8181818 0.9310345 1.0414962   
## 85 <{3302},   
## {6203}> => <{6201}> 0.6363636 0.8400000 0.9396610   
## 86 <{5801},   
## {6203}> => <{6201}> 0.6666667 0.8800000 0.9844068   
## 87 <{5802},   
## {6203}> => <{6201}> 0.7121212 0.8703704 0.9736347   
## 88 <{5803},   
## {6203}> => <{6201}> 0.7121212 0.8545455 0.9559322   
## 89 <{6001},   
## {6203}> => <{6201}> 0.6363636 0.8235294 0.9212363   
## 90 <{6203},   
## {6203}> => <{6201}> 0.6363636 0.8400000 0.9396610   
## 91 <{6003},   
## {6202}> => <{6201}> 0.5303030 0.8139535 0.9105242   
## 92 <{3302},   
## {6201}> => <{6201}> 0.6212121 0.8723404 0.9758384   
## 93 <{5803},   
## {6201}> => <{6201}> 0.6515152 0.8113208 0.9075791   
## 94 <{3302},   
## {6003}> => <{6201}> 0.5757576 0.8837209 0.9885692   
## 95 <{5801},   
## {6003}> => <{6201}> 0.5757576 0.8837209 0.9885692   
## 96 <{5802},   
## {6003}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 97 <{5803},   
## {6003}> => <{6201}> 0.5909091 0.8297872 0.9282366   
## 98 <{6001},   
## {6003}> => <{6201}> 0.5454545 0.8181818 0.9152542   
## 99 <{6002},   
## {6003}> => <{6201}> 0.5303030 0.8333333 0.9322034   
## 100 <{6003},   
## {6003}> => <{6201}> 0.5303030 0.8536585 0.9549401   
##

#inspect all rules 531  
#inspect(seqRules,531)  
  
#Sorting rules  
inspect(head(sort(seqRules, by=c("confidence", "support")),531))

## lhs rhs support confidence lift   
## 1 <{5803}> => <{6203}> 0.8333333 0.9821429 1.1176108   
## 2 <{5803}> => <{5803}> 0.8333333 0.9821429 1.1575255   
## 3 <{5803}> => <{5802}> 0.8333333 0.9821429 1.0986683   
## 4 <{5803},   
## {6001}> => <{5802}> 0.6969697 0.9787234 1.0948431   
## 5 <{3302},   
## {6001}> => <{5802}> 0.6060606 0.9756098 1.0913601   
## 6 <{3303},   
## {3303}> => <{3302}> 0.5151515 0.9714286 1.1448980   
## 7 <{5801},   
## {3303}> => <{3302}> 0.5000000 0.9705882 1.1439076   
## 8 <{5803},   
## {3303}> => <{3302}> 0.5000000 0.9705882 1.1439076   
## 9 <{5803}> => <{5801}> 0.8181818 0.9642857 1.0786925   
## 10 <{6001}> => <{5802}> 0.8030303 0.9636364 1.0779661   
## 11 <{3302},   
## {6201}> => <{3302}> 0.6818182 0.9574468 1.1284195   
## 12 <{3302},   
## {6001}> => <{6201}> 0.5909091 0.9512195 1.0640761   
## 13 <{3302},   
## {6001}> => <{5803}> 0.5909091 0.9512195 1.1210801   
## 14 <{6203}> => <{5802}> 0.8333333 0.9482759 1.0607832   
## 15 <{5803}> => <{6201}> 0.8030303 0.9464286 1.0587167   
## 16 <{3303},   
## {3302}> => <{3302}> 0.5303030 0.9459459 1.1148649   
## 17 <{6001}> => <{6201}> 0.7878788 0.9454545 1.0576271   
## 18 <{5802},   
## {6203}> => <{5802}> 0.7727273 0.9444444 1.0564972   
## 19 <{6003}> => <{5802}> 0.7575758 0.9433962 1.0553246   
## 20 <{3303},   
## {6201}> => <{5803}> 0.5000000 0.9428571 1.1112245   
## 21 <{6201},   
## {3303}> => <{5803}> 0.5000000 0.9428571 1.1112245   
## 22 <{3303},   
## {3303}> => <{3303}> 0.5000000 0.9428571 1.5177700   
## 23 <{6201},   
## {3303}> => <{3302}> 0.5000000 0.9428571 1.1112245   
## 24 <{6203},   
## {5801}> => <{6201}> 0.7424242 0.9423077 1.0541069   
## 25 <{6001},   
## {6203}> => <{5802}> 0.7272727 0.9411765 1.0528415   
## 26 <{5802},   
## {3302}> => <{5803}> 0.7121212 0.9400000 1.1078571   
## 27 <{6001},   
## {5803}> => <{6203}> 0.6969697 0.9387755 1.0682618   
## 28 <{5801},   
## {6001}> => <{6201}> 0.6969697 0.9387755 1.0501557   
## 29 <{6001},   
## {5803}> => <{5802}> 0.6969697 0.9387755 1.0501557   
## 30 <{5803},   
## {3302}> => <{5801}> 0.6969697 0.9387755 1.0501557   
## 31 <{3302},   
## {5802}> => <{5803}> 0.6818182 0.9375000 1.1049107   
## 32 <{6201},   
## {3302}> => <{5803}> 0.6818182 0.9375000 1.1049107   
## 33 <{6201},   
## {3302}> => <{5801}> 0.6818182 0.9375000 1.0487288   
## 34 <{3302},   
## {5802}> => <{3302}> 0.6818182 0.9375000 1.1049107   
## 35 <{3302},   
## {6201}> => <{5803}> 0.6666667 0.9361702 1.1033435   
## 36 <{6202},   
## {3302}> => <{3302}> 0.6515152 0.9347826 1.1017081   
## 37 <{3301},   
## {5803}> => <{3302}> 0.6363636 0.9333333 1.1000000   
## 38 <{6201}> => <{6203}> 0.8333333 0.9322034 1.0607832   
## 39 <{5802}> => <{6201}> 0.8333333 0.9322034 1.0428038   
## 40 <{6201}> => <{5803}> 0.8333333 0.9322034 1.0986683   
## 41 <{5802}> => <{5802}> 0.8333333 0.9322034 1.0428038   
## 42 <{5802}> => <{5801}> 0.8333333 0.9322034 1.0428038   
## 43 <{6201}> => <{5801}> 0.8333333 0.9322034 1.0428038   
## 44 <{6001},   
## {3302}> => <{5803}> 0.6212121 0.9318182 1.0982143   
## 45 <{6201},   
## {6002}> => <{5801}> 0.6212121 0.9318182 1.0423729   
## 46 <{6001},   
## {3302}> => <{3302}> 0.6212121 0.9318182 1.0982143   
## 47 <{6203}> => <{6201}> 0.8181818 0.9310345 1.0414962   
## 48 <{6203}> => <{5803}> 0.8181818 0.9310345 1.0972906   
## 49 <{3301},   
## {6201}> => <{3302}> 0.6060606 0.9302326 1.0963455   
## 50 <{6001}> => <{6203}> 0.7727273 0.9272727 1.0551724   
## 51 <{5803},   
## {6203}> => <{5803}> 0.7727273 0.9272727 1.0928571   
## 52 <{3301},   
## {6001}> => <{5802}> 0.5606061 0.9250000 1.0347458   
## 53 <{6401}> => <{5801}> 0.5606061 0.9250000 1.0347458   
## 54 <{6003}> => <{6201}> 0.7424242 0.9245283 1.0342181   
## 55 <{6203},   
## {3302}> => <{5803}> 0.7121212 0.9215686 1.0861345   
## 56 <{6003},   
## {3301}> => <{3302}> 0.5303030 0.9210526 1.0855263   
## 57 <{3302},   
## {5803}> => <{6203}> 0.6969697 0.9200000 1.0468966   
## 58 <{5801},   
## {5801}> => <{6201}> 0.6969697 0.9200000 1.0291525   
## 59 <{5802},   
## {3302}> => <{5802}> 0.6969697 0.9200000 1.0291525   
## 60 <{3302},   
## {5803}> => <{5801}> 0.6969697 0.9200000 1.0291525   
## 61 <{3302},   
## {5803}> => <{3302}> 0.6969697 0.9200000 1.0842857   
## 62 <{5801},   
## {6001}> => <{5802}> 0.6818182 0.9183673 1.0273262   
## 63 <{6201},   
## {6001}> => <{5802}> 0.6818182 0.9183673 1.0273262   
## 64 <{5803},   
## {3302}> => <{5802}> 0.6818182 0.9183673 1.0273262   
## 65 <{6003},   
## {6201}> => <{5801}> 0.6818182 0.9183673 1.0273262   
## 66 <{3302},   
## {3303}> => <{6201}> 0.5000000 0.9166667 1.0254237   
## 67 <{3302},   
## {3303}> => <{3303}> 0.5000000 0.9166667 1.4756098   
## 68 <{3302},   
## {3303}> => <{3302}> 0.5000000 0.9166667 1.0803571   
## 69 <{6203},   
## {6001}> => <{6201}> 0.6666667 0.9166667 1.0254237   
## 70 <{3302},   
## {5802}> => <{6201}> 0.6666667 0.9166667 1.0254237   
## 71 <{3302},   
## {5801}> => <{5803}> 0.6666667 0.9166667 1.0803571   
## 72 <{6203},   
## {6001}> => <{5802}> 0.6666667 0.9166667 1.0254237   
## 73 <{5801},   
## {3302}> => <{3302}> 0.6666667 0.9166667 1.0803571   
## 74 <{6201},   
## {3302}> => <{3302}> 0.6666667 0.9166667 1.0803571   
## 75 <{5802}> => <{6203}> 0.8181818 0.9152542 1.0414962   
## 76 <{5802}> => <{5803}> 0.8181818 0.9152542 1.0786925   
## 77 <{6201}> => <{5802}> 0.8181818 0.9152542 1.0238437   
## 78 <{5803},   
## {6001}> => <{6201}> 0.6515152 0.9148936 1.0234403   
## 79 <{5803},   
## {6003}> => <{5803}> 0.6515152 0.9148936 1.0782675   
## 80 <{3302},   
## {3301}> => <{3302}> 0.6515152 0.9148936 1.0782675   
## 81 <{6202}> => <{5803}> 0.8030303 0.9137931 1.0769704   
## 82 <{3302},   
## {6202}> => <{5803}> 0.6363636 0.9130435 1.0760870   
## 83 <{5803},   
## {3301}> => <{5802}> 0.6212121 0.9111111 1.0192090   
## 84 <{3302}> => <{3302}> 0.7727273 0.9107143 1.0733418   
## 85 <{6001},   
## {3302}> => <{6201}> 0.6060606 0.9090909 1.0169492   
## 86 <{6202},   
## {6001}> => <{5802}> 0.6060606 0.9090909 1.0169492   
## 87 <{5802},   
## {6201}> => <{5803}> 0.7575758 0.9090909 1.0714286   
## 88 <{6203},   
## {5802}> => <{5801}> 0.7575758 0.9090909 1.0169492   
## 89 <{5802},   
## {6203}> => <{5803}> 0.7424242 0.9074074 1.0694444   
## 90 <{5802},   
## {5803}> => <{5803}> 0.7424242 0.9074074 1.0694444   
## 91 <{6203},   
## {5803}> => <{5803}> 0.7424242 0.9074074 1.0694444   
## 92 <{6203},   
## {5803}> => <{5802}> 0.7424242 0.9074074 1.0150659   
## 93 <{6201},   
## {5802}> => <{5801}> 0.7424242 0.9074074 1.0150659   
## 94 <{6002}> => <{6203}> 0.7272727 0.9056604 1.0305791   
## 95 <{6002}> => <{6001}> 0.7272727 0.9056604 1.0867925   
## 96 <{6003}> => <{5803}> 0.7272727 0.9056604 1.0673854   
## 97 <{5801},   
## {6201}> => <{5802}> 0.7272727 0.9056604 1.0131116   
## 98 <{5803},   
## {6201}> => <{5802}> 0.7272727 0.9056604 1.0131116   
## 99 <{6002}> => <{5801}> 0.7272727 0.9056604 1.0131116   
## 100 <{6003},   
## {3302}> => <{5803}> 0.5757576 0.9047619 1.0663265   
## 101 <{6003},   
## {3302}> => <{5801}> 0.5757576 0.9047619 1.0121065   
## 102 <{6203},   
## {5801}> => <{5803}> 0.7121212 0.9038462 1.0652473   
## 103 <{6202},   
## {6003}> => <{5803}> 0.5606061 0.9024390 1.0635889   
## 104 <{3303}> => <{3302}> 0.5606061 0.9024390 1.0635889   
## 105 <{5802},   
## {6001}> => <{6203}> 0.6969697 0.9019608 1.0263692   
## 106 <{3302},   
## {3302}> => <{5801}> 0.6969697 0.9019608 1.0089731   
## 107 <{3302},   
## {3302}> => <{3302}> 0.6969697 0.9019608 1.0630252   
## 108 <{5802},   
## {3302}> => <{6201}> 0.6818182 0.9000000 1.0067797   
## 109 <{3302},   
## {6203}> => <{5803}> 0.6818182 0.9000000 1.0607143   
## 110 <{6203},   
## {6203}> => <{5803}> 0.6818182 0.9000000 1.0607143   
## 111 <{5801},   
## {6203}> => <{5802}> 0.6818182 0.9000000 1.0067797   
## 112 <{3302},   
## {5803}> => <{5802}> 0.6818182 0.9000000 1.0067797   
## 113 <{5801},   
## {6202}> => <{5801}> 0.6818182 0.9000000 1.0067797   
## 114 <{5802},   
## {3302}> => <{5801}> 0.6818182 0.9000000 1.0067797   
## 115 <{6401}> => <{6203}> 0.5454545 0.9000000 1.0241379   
## 116 <{6203},   
## {3301}> => <{5803}> 0.5454545 0.9000000 1.0607143   
## 117 <{5801}> => <{6201}> 0.8030303 0.8983051 1.0048837   
## 118 <{5801}> => <{5803}> 0.8030303 0.8983051 1.0587167   
## 119 <{5801}> => <{5802}> 0.8030303 0.8983051 1.0048837   
## 120 <{5803},   
## {3302}> => <{6201}> 0.6666667 0.8979592 1.0044967   
## 121 <{5803},   
## {3302}> => <{5803}> 0.6666667 0.8979592 1.0583090   
## 122 <{5803},   
## {3302}> => <{3302}> 0.6666667 0.8979592 1.0583090   
## 123 <{6203}> => <{5801}> 0.7878788 0.8965517 1.0029223   
## 124 <{6201},   
## {3302}> => <{6203}> 0.6515152 0.8958333 1.0193966   
## 125 <{5801},   
## {3302}> => <{5803}> 0.6515152 0.8958333 1.0558036   
## 126 <{3302},   
## {5802}> => <{5801}> 0.6515152 0.8958333 1.0021186   
## 127 <{3301},   
## {3302}> => <{3302}> 0.6515152 0.8958333 1.0558036   
## 128 <{6402}> => <{5803}> 0.5151515 0.8947368 1.0545113   
## 129 <{6003},   
## {3301}> => <{5802}> 0.5151515 0.8947368 1.0008921   
## 130 <{3301},   
## {3301}> => <{3302}> 0.5151515 0.8947368 1.0545113   
## 131 <{5801},   
## {6002}> => <{6001}> 0.6363636 0.8936170 1.0723404   
## 132 <{3302},   
## {3301}> => <{5803}> 0.6363636 0.8936170 1.0531915   
## 133 <{3302},   
## {6201}> => <{5802}> 0.6363636 0.8936170 0.9996394   
## 134 <{3302},   
## {6201}> => <{5801}> 0.6363636 0.8936170 0.9996394   
## 135 <{5803},   
## {6001}> => <{5801}> 0.6363636 0.8936170 0.9996394   
## 136 <{3301},   
## {5802}> => <{3302}> 0.6363636 0.8936170 1.0531915   
## 137 <{3302}> => <{6203}> 0.7575758 0.8928571 1.0160099   
## 138 <{5803}> => <{6202}> 0.7575758 0.8928571 1.0160099   
## 139 <{3302}> => <{5803}> 0.7575758 0.8928571 1.0522959   
## 140 <{3303},   
## {3302}> => <{6201}> 0.5000000 0.8918919 0.9977096   
## 141 <{6403}> => <{5801}> 0.5000000 0.8918919 0.9977096   
## 142 <{3303},   
## {3302}> => <{3303}> 0.5000000 0.8918919 1.4357284   
## 143 <{6003},   
## {6001}> => <{5802}> 0.6212121 0.8913043 0.9970523   
## 144 <{6001}> => <{5803}> 0.7424242 0.8909091 1.0500000   
## 145 <{5803},   
## {6203}> => <{5802}> 0.7424242 0.8909091 0.9966102   
## 146 <{6201},   
## {6203}> => <{5802}> 0.7424242 0.8909091 0.9966102   
## 147 <{6001}> => <{5801}> 0.7424242 0.8909091 0.9966102   
## 148 <{6002},   
## {5803}> => <{5803}> 0.6060606 0.8888889 1.0476190   
## 149 <{6003},   
## {6203}> => <{5802}> 0.6060606 0.8888889 0.9943503   
## 150 <{6001},   
## {6202}> => <{5802}> 0.6060606 0.8888889 0.9943503   
## 151 <{5803},   
## {3301}> => <{3302}> 0.6060606 0.8888889 1.0476190   
## 152 <{6203},   
## {6201}> => <{5803}> 0.7272727 0.8888889 1.0476190   
## 153 <{6203},   
## {6201}> => <{5802}> 0.7272727 0.8888889 0.9943503   
## 154 <{5802},   
## {6203}> => <{5801}> 0.7272727 0.8888889 0.9943503   
## 155 <{3301}> => <{3302}> 0.7272727 0.8888889 1.0476190   
## 156 <{5802},   
## {6203}> => <{3302}> 0.7272727 0.8888889 1.0476190   
## 157 <{6002}> => <{6201}> 0.7121212 0.8867925 0.9920051   
## 158 <{5801},   
## {5802}> => <{6201}> 0.7121212 0.8867925 0.9920051   
## 159 <{5801},   
## {6201}> => <{5803}> 0.7121212 0.8867925 1.0451482   
## 160 <{5803},   
## {6201}> => <{5803}> 0.7121212 0.8867925 1.0451482   
## 161 <{6001},   
## {3302}> => <{6002}> 0.5909091 0.8863636 1.1037736   
## 162 <{6002},   
## {5802}> => <{6001}> 0.5909091 0.8863636 1.0636364   
## 163 <{6001},   
## {6003}> => <{5802}> 0.5909091 0.8863636 0.9915254   
## 164 <{6001},   
## {3302}> => <{5802}> 0.5909091 0.8863636 0.9915254   
## 165 <{6201},   
## {3301}> => <{5802}> 0.5909091 0.8863636 0.9915254   
## 166 <{6001},   
## {6201}> => <{5802}> 0.6969697 0.8846154 0.9895698   
## 167 <{3302},   
## {6003}> => <{6201}> 0.5757576 0.8837209 0.9885692   
## 168 <{5801},   
## {6003}> => <{6201}> 0.5757576 0.8837209 0.9885692   
## 169 <{3302},   
## {6003}> => <{3302}> 0.5757576 0.8837209 1.0415282   
## 170 <{3302},   
## {3302}> => <{6201}> 0.6818182 0.8823529 0.9870389   
## 171 <{3302},   
## {3302}> => <{5803}> 0.6818182 0.8823529 1.0399160   
## 172 <{6201}> => <{6201}> 0.7878788 0.8813559 0.9859236   
## 173 <{5801},   
## {3301}> => <{5802}> 0.5606061 0.8809524 0.9854722   
## 174 <{5801},   
## {6203}> => <{6201}> 0.6666667 0.8800000 0.9844068   
## 175 <{3302},   
## {5803}> => <{6201}> 0.6666667 0.8800000 0.9844068   
## 176 <{5801},   
## {6203}> => <{5803}> 0.6666667 0.8800000 1.0371429   
## 177 <{5803},   
## {6202}> => <{5803}> 0.6666667 0.8800000 1.0371429   
## 178 <{3302},   
## {5803}> => <{5803}> 0.6666667 0.8800000 1.0371429   
## 179 <{5802},   
## {3302}> => <{3302}> 0.6666667 0.8800000 1.0371429   
## 180 <{6202}> => <{6201}> 0.7727273 0.8793103 0.9836353   
## 181 <{6202}> => <{5802}> 0.7727273 0.8793103 0.9836353   
## 182 <{6202}> => <{5801}> 0.7727273 0.8793103 0.9836353   
## 183 <{6203}> => <{3302}> 0.7727273 0.8793103 1.0363300   
## 184 <{3302},   
## {6001}> => <{6203}> 0.5454545 0.8780488 0.9991590   
## 185 <{3302},   
## {6001}> => <{3302}> 0.5454545 0.8780488 1.0348432   
## 186 <{6203},   
## {6003}> => <{6201}> 0.6515152 0.8775510 0.9816672   
## 187 <{6003},   
## {6201}> => <{6001}> 0.6515152 0.8775510 1.0530612   
## 188 <{5801},   
## {6001}> => <{5803}> 0.6515152 0.8775510 1.0342566   
## 189 <{6201},   
## {6001}> => <{5803}> 0.6515152 0.8775510 1.0342566   
## 190 <{6001},   
## {5803}> => <{5803}> 0.6515152 0.8775510 1.0342566   
## 191 <{6001},   
## {5803}> => <{3302}> 0.6515152 0.8775510 1.0342566   
## 192 <{5803}> => <{3302}> 0.7424242 0.8750000 1.0312500   
## 193 <{6001},   
## {6001}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 194 <{3302},   
## {5801}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 195 <{5801},   
## {3302}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 196 <{6201},   
## {3302}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 197 <{6002},   
## {5801}> => <{6001}> 0.6363636 0.8750000 1.0500000   
## 198 <{6203},   
## {6001}> => <{5803}> 0.6363636 0.8750000 1.0312500   
## 199 <{3302},   
## {5801}> => <{3302}> 0.6363636 0.8750000 1.0312500   
## 200 <{6203},   
## {3301}> => <{6203}> 0.5303030 0.8750000 0.9956897   
## 201 <{6203},   
## {3301}> => <{5802}> 0.5303030 0.8750000 0.9788136   
## 202 <{6203},   
## {3301}> => <{3302}> 0.5303030 0.8750000 1.0312500   
## 203 <{6201},   
## {5803}> => <{6203}> 0.7272727 0.8727273 0.9931034   
## 204 <{6001}> => <{6001}> 0.7272727 0.8727273 1.0472727   
## 205 <{6201},   
## {5803}> => <{5803}> 0.7272727 0.8727273 1.0285714   
## 206 <{6203},   
## {5802}> => <{5803}> 0.7272727 0.8727273 1.0285714   
## 207 <{5803},   
## {6203}> => <{5801}> 0.7272727 0.8727273 0.9762712   
## 208 <{5802},   
## {6201}> => <{5801}> 0.7272727 0.8727273 0.9762712   
## 209 <{3302},   
## {6201}> => <{6201}> 0.6212121 0.8723404 0.9758384   
## 210 <{5803},   
## {6001}> => <{5803}> 0.6212121 0.8723404 1.0281155   
## 211 <{3302},   
## {3301}> => <{5802}> 0.6212121 0.8723404 0.9758384   
## 212 <{6202},   
## {6203}> => <{5801}> 0.6212121 0.8723404 0.9758384   
## 213 <{5802},   
## {6203}> => <{6201}> 0.7121212 0.8703704 0.9736347   
## 214 <{3301}> => <{5802}> 0.7121212 0.8703704 0.9736347   
## 215 <{6203},   
## {5803}> => <{3302}> 0.7121212 0.8703704 1.0257937   
## 216 <{5802},   
## {6401}> => <{5803}> 0.5000000 0.8684211 1.0234962   
## 217 <{3301},   
## {3301}> => <{5802}> 0.5000000 0.8684211 0.9714541   
## 218 <{6402}> => <{5801}> 0.5000000 0.8684211 0.9714541   
## 219 <{5801},   
## {6201}> => <{6203}> 0.6969697 0.8679245 0.9876383   
## 220 <{5801},   
## {5803}> => <{6203}> 0.6969697 0.8679245 0.9876383   
## 221 <{6001},   
## {5802}> => <{6201}> 0.6969697 0.8679245 0.9708986   
## 222 <{6003}> => <{6001}> 0.6969697 0.8679245 1.0415094   
## 223 <{5801},   
## {5803}> => <{5802}> 0.6969697 0.8679245 0.9708986   
## 224 <{5801},   
## {6201}> => <{5801}> 0.6969697 0.8679245 0.9708986   
## 225 <{6003},   
## {5801}> => <{6001}> 0.5909091 0.8666667 1.0400000   
## 226 <{6203},   
## {6002}> => <{5803}> 0.5909091 0.8666667 1.0214286   
## 227 <{6002},   
## {6202}> => <{5802}> 0.5909091 0.8666667 0.9694915   
## 228 <{3301},   
## {5803}> => <{5802}> 0.5909091 0.8666667 0.9694915   
## 229 <{6203},   
## {5801}> => <{5802}> 0.6818182 0.8653846 0.9680574   
## 230 <{5802}> => <{6202}> 0.7727273 0.8644068 0.9836353   
## 231 <{5802}> => <{6001}> 0.7727273 0.8644068 1.0372881   
## 232 <{3302},   
## {6002}> => <{6203}> 0.5757576 0.8636364 0.9827586   
## 233 <{6001},   
## {3302}> => <{6003}> 0.5757576 0.8636364 1.0754717   
## 234 <{3302},   
## {6002}> => <{5803}> 0.5757576 0.8636364 1.0178571   
## 235 <{6202},   
## {6001}> => <{5803}> 0.5757576 0.8636364 1.0178571   
## 236 <{6203},   
## {3302}> => <{6201}> 0.6666667 0.8627451 0.9651047   
## 237 <{6001},   
## {6203}> => <{5803}> 0.6666667 0.8627451 1.0168067   
## 238 <{6203},   
## {3302}> => <{5802}> 0.6666667 0.8627451 0.9651047   
## 239 <{6203}> => <{6203}> 0.7575758 0.8620690 0.9809750   
## 240 <{6203}> => <{6202}> 0.7575758 0.8620690 0.9809750   
## 241 <{3301},   
## {6203}> => <{5803}> 0.5606061 0.8604651 1.0141196   
## 242 <{3301},   
## {6201}> => <{5803}> 0.5606061 0.8604651 1.0141196   
## 243 <{3302},   
## {6003}> => <{5803}> 0.5606061 0.8604651 1.0141196   
## 244 <{3301},   
## {6203}> => <{5802}> 0.5606061 0.8604651 0.9625542   
## 245 <{3302},   
## {6203}> => <{5802}> 0.6515152 0.8600000 0.9620339   
## 246 <{6203},   
## {6203}> => <{5802}> 0.6515152 0.8600000 0.9620339   
## 247 <{3302}> => <{5802}> 0.7272727 0.8571429 0.9588378   
## 248 <{3302}> => <{5801}> 0.7272727 0.8571429 0.9588378   
## 249 <{6001},   
## {5803}> => <{6003}> 0.6363636 0.8571429 1.0673854   
## 250 <{5801},   
## {6001}> => <{5801}> 0.6363636 0.8571429 0.9588378   
## 251 <{6003},   
## {3302}> => <{6203}> 0.5454545 0.8571429 0.9753695   
## 252 <{6003},   
## {3302}> => <{6201}> 0.5454545 0.8571429 0.9588378   
## 253 <{6002},   
## {3302}> => <{5803}> 0.5454545 0.8571429 1.0102041   
## 254 <{6003},   
## {3302}> => <{5802}> 0.5454545 0.8571429 0.9588378   
## 255 <{6001},   
## {3301}> => <{5802}> 0.5454545 0.8571429 0.9588378   
## 256 <{6003},   
## {3302}> => <{3302}> 0.5454545 0.8571429 1.0102041   
## 257 <{5801},   
## {3301}> => <{3302}> 0.5454545 0.8571429 1.0102041   
## 258 <{5803},   
## {5803}> => <{6203}> 0.7121212 0.8545455 0.9724138   
## 259 <{5803},   
## {5802}> => <{6203}> 0.7121212 0.8545455 0.9724138   
## 260 <{5803},   
## {6203}> => <{6201}> 0.7121212 0.8545455 0.9559322   
## 261 <{5803},   
## {5803}> => <{6201}> 0.7121212 0.8545455 0.9559322   
## 262 <{6201},   
## {6203}> => <{5803}> 0.7121212 0.8545455 1.0071429   
## 263 <{5803},   
## {5803}> => <{5802}> 0.7121212 0.8545455 0.9559322   
## 264 <{6201},   
## {5803}> => <{5802}> 0.7121212 0.8545455 0.9559322   
## 265 <{5803},   
## {5802}> => <{5801}> 0.7121212 0.8545455 0.9559322   
## 266 <{6201},   
## {5803}> => <{3302}> 0.7121212 0.8545455 1.0071429   
## 267 <{3302},   
## {5802}> => <{6203}> 0.6212121 0.8541667 0.9719828   
## 268 <{3301},   
## {3302}> => <{5803}> 0.6212121 0.8541667 1.0066964   
## 269 <{3302},   
## {5802}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 270 <{3302},   
## {5801}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 271 <{5801},   
## {3302}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 272 <{6201},   
## {3302}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 273 <{6002},   
## {6001}> => <{5801}> 0.6212121 0.8541667 0.9555085   
## 274 <{5801},   
## {3302}> => <{5801}> 0.6212121 0.8541667 0.9555085   
## 275 <{3303}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 276 <{6003},   
## {6003}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 277 <{6202},   
## {6003}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 278 <{6003},   
## {6003}> => <{5803}> 0.5303030 0.8536585 1.0060976   
## 279 <{6202},   
## {6003}> => <{5802}> 0.5303030 0.8536585 0.9549401   
## 280 <{3303}> => <{3303}> 0.5303030 0.8536585 1.3741820   
## 281 <{6201},   
## {5802}> => <{6203}> 0.6969697 0.8518519 0.9693487   
## 282 <{6203},   
## {5803}> => <{6201}> 0.6969697 0.8518519 0.9529190   
## 283 <{3302},   
## {6201}> => <{6203}> 0.6060606 0.8510638 0.9684519   
## 284 <{5803},   
## {6001}> => <{6203}> 0.6060606 0.8510638 0.9684519   
## 285 <{6002},   
## {6201}> => <{6001}> 0.6060606 0.8510638 1.0212766   
## 286 <{6002},   
## {6201}> => <{5801}> 0.6060606 0.8510638 0.9520375   
## 287 <{3301},   
## {5802}> => <{5801}> 0.6060606 0.8510638 0.9520375   
## 288 <{6401}> => <{5803}> 0.5151515 0.8500000 1.0017857   
## 289 <{3301},   
## {6202}> => <{3302}> 0.5151515 0.8500000 1.0017857   
## 290 <{6003}> => <{6203}> 0.6818182 0.8490566 0.9661679   
## 291 <{6002}> => <{6202}> 0.6818182 0.8490566 0.9661679   
## 292 <{5801},   
## {5803}> => <{6201}> 0.6818182 0.8490566 0.9497921   
## 293 <{6003}> => <{6002}> 0.6818182 0.8490566 1.0573158   
## 294 <{6002}> => <{5803}> 0.6818182 0.8490566 1.0006739   
## 295 <{6003}> => <{5801}> 0.6818182 0.8490566 0.9497921   
## 296 <{6202},   
## {3302}> => <{6201}> 0.5909091 0.8478261 0.9484156   
## 297 <{6202},   
## {3302}> => <{5803}> 0.5909091 0.8478261 0.9992236   
## 298 <{5802},   
## {3301}> => <{5803}> 0.5909091 0.8478261 0.9992236   
## 299 <{6202},   
## {3302}> => <{5802}> 0.5909091 0.8478261 0.9484156   
## 300 <{3302},   
## {6202}> => <{3302}> 0.5909091 0.8478261 0.9992236   
## 301 <{5802},   
## {3301}> => <{3302}> 0.5909091 0.8478261 0.9992236   
## 302 <{5801}> => <{6203}> 0.7575758 0.8474576 0.9643483   
## 303 <{5801}> => <{6202}> 0.7575758 0.8474576 0.9643483   
## 304 <{6201}> => <{6202}> 0.7575758 0.8474576 0.9643483   
## 305 <{5802}> => <{6002}> 0.7575758 0.8474576 1.0553246   
## 306 <{5801}> => <{5801}> 0.7575758 0.8474576 0.9480034   
## 307 <{5802}> => <{3302}> 0.7575758 0.8474576 0.9987893   
## 308 <{6203}> => <{6003}> 0.7424242 0.8448276 1.0520494   
## 309 <{6003},   
## {6203}> => <{6203}> 0.5757576 0.8444444 0.9609195   
## 310 <{5803},   
## {6002}> => <{6203}> 0.5757576 0.8444444 0.9609195   
## 311 <{6003},   
## {5801}> => <{6201}> 0.5757576 0.8444444 0.9446328   
## 312 <{5803},   
## {3301}> => <{6201}> 0.5757576 0.8444444 0.9446328   
## 313 <{6003},   
## {6203}> => <{5803}> 0.5757576 0.8444444 0.9952381   
## 314 <{6202},   
## {6202}> => <{5803}> 0.5757576 0.8444444 0.9952381   
## 315 <{5803},   
## {3301}> => <{5803}> 0.5757576 0.8444444 0.9952381   
## 316 <{6202},   
## {6202}> => <{5802}> 0.5757576 0.8444444 0.9446328   
## 317 <{6003},   
## {6203}> => <{5801}> 0.5757576 0.8444444 0.9446328   
## 318 <{6202},   
## {5801}> => <{6201}> 0.6515152 0.8431373 0.9431705   
## 319 <{5802},   
## {6001}> => <{5803}> 0.6515152 0.8431373 0.9936975   
## 320 <{3302},   
## {3302}> => <{5802}> 0.6515152 0.8431373 0.9431705   
## 321 <{6203},   
## {3302}> => <{3302}> 0.6515152 0.8431373 0.9936975   
## 322 <{6001},   
## {3302}> => <{6203}> 0.5606061 0.8409091 0.9568966   
## 323 <{3302},   
## {6002}> => <{6201}> 0.5606061 0.8409091 0.9406780   
## 324 <{6202},   
## {6001}> => <{6201}> 0.5606061 0.8409091 0.9406780   
## 325 <{6002},   
## {5802}> => <{6201}> 0.5606061 0.8409091 0.9406780   
## 326 <{6202},   
## {6001}> => <{6001}> 0.5606061 0.8409091 1.0090909   
## 327 <{3302},   
## {6002}> => <{5801}> 0.5606061 0.8409091 0.9406780   
## 328 <{6002},   
## {5802}> => <{5801}> 0.5606061 0.8409091 0.9406780   
## 329 <{5802},   
## {3302}> => <{6203}> 0.6363636 0.8400000 0.9558621   
## 330 <{3302},   
## {6203}> => <{6201}> 0.6363636 0.8400000 0.9396610   
## 331 <{6203},   
## {6203}> => <{6201}> 0.6363636 0.8400000 0.9396610   
## 332 <{5802},   
## {6002}> => <{6001}> 0.6363636 0.8400000 1.0080000   
## 333 <{5801},   
## {5801}> => <{6001}> 0.6363636 0.8400000 1.0080000   
## 334 <{6203},   
## {6202}> => <{5803}> 0.6363636 0.8400000 0.9900000   
## 335 <{5801},   
## {5801}> => <{5803}> 0.6363636 0.8400000 0.9900000   
## 336 <{6203},   
## {6202}> => <{5801}> 0.6363636 0.8400000 0.9396610   
## 337 <{3302}> => <{6201}> 0.7121212 0.8392857 0.9388620   
## 338 <{5803}> => <{6003}> 0.7121212 0.8392857 1.0451482   
## 339 <{5803}> => <{6001}> 0.7121212 0.8392857 1.0071429   
## 340 <{3302}> => <{3301}> 0.7121212 0.8392857 1.0257937   
## 341 <{6003},   
## {6202}> => <{6002}> 0.5454545 0.8372093 1.0425625   
## 342 <{3302},   
## {6003}> => <{5802}> 0.5454545 0.8372093 0.9365392   
## 343 <{5801},   
## {6001}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 344 <{6201},   
## {6001}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 345 <{5803},   
## {3302}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 346 <{5802},   
## {6003}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 347 <{6201},   
## {6001}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 348 <{6001},   
## {5803}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 349 <{6001},   
## {5801}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 350 <{6001},   
## {5801}> => <{6001}> 0.6212121 0.8367347 1.0040816   
## 351 <{6203},   
## {6003}> => <{5803}> 0.6212121 0.8367347 0.9861516   
## 352 <{6203},   
## {6003}> => <{5802}> 0.6212121 0.8367347 0.9360083   
## 353 <{6001},   
## {5801}> => <{5802}> 0.6212121 0.8367347 0.9360083   
## 354 <{6203},   
## {5802}> => <{6201}> 0.6969697 0.8363636 0.9355932   
## 355 <{5802},   
## {5801}> => <{6201}> 0.6969697 0.8363636 0.9355932   
## 356 <{6203},   
## {5802}> => <{3302}> 0.6969697 0.8363636 0.9857143   
## 357 <{5801},   
## {3302}> => <{6203}> 0.6060606 0.8333333 0.9482759   
## 358 <{3301},   
## {3302}> => <{6201}> 0.6060606 0.8333333 0.9322034   
## 359 <{6002},   
## {5801}> => <{5803}> 0.6060606 0.8333333 0.9821429   
## 360 <{6203},   
## {5803}> => <{6203}> 0.6818182 0.8333333 0.9482759   
## 361 <{5803},   
## {5801}> => <{6201}> 0.6818182 0.8333333 0.9322034   
## 362 <{3301}> => <{5803}> 0.6818182 0.8333333 0.9821429   
## 363 <{5803},   
## {5801}> => <{5802}> 0.6818182 0.8333333 0.9322034   
## 364 <{6203},   
## {6201}> => <{5801}> 0.6818182 0.8333333 0.9322034   
## 365 <{6002},   
## {6003}> => <{6201}> 0.5303030 0.8333333 0.9322034   
## 366 <{5801},   
## {3301}> => <{6201}> 0.5303030 0.8333333 0.9322034   
## 367 <{6003},   
## {3302}> => <{6003}> 0.5303030 0.8333333 1.0377358   
## 368 <{6002},   
## {3302}> => <{6001}> 0.5303030 0.8333333 1.0000000   
## 369 <{6003},   
## {3302}> => <{6001}> 0.5303030 0.8333333 1.0000000   
## 370 <{3301},   
## {5801}> => <{5803}> 0.5303030 0.8333333 0.9821429   
## 371 <{5801},   
## {3301}> => <{5803}> 0.5303030 0.8333333 0.9821429   
## 372 <{6001},   
## {3301}> => <{5803}> 0.5303030 0.8333333 0.9821429   
## 373 <{3301},   
## {5801}> => <{3302}> 0.5303030 0.8333333 0.9821429   
## 374 <{6002},   
## {3302}> => <{3302}> 0.5303030 0.8333333 0.9821429   
## 375 <{6001},   
## {3301}> => <{3302}> 0.5303030 0.8333333 0.9821429   
## 376 <{5802}> => <{6003}> 0.7424242 0.8305085 1.0342181   
## 377 <{5801}> => <{6001}> 0.7424242 0.8305085 0.9966102   
## 378 <{6201}> => <{6001}> 0.7424242 0.8305085 0.9966102   
## 379 <{5801},   
## {6201}> => <{6001}> 0.6666667 0.8301887 0.9962264   
## 380 <{6002}> => <{5802}> 0.6666667 0.8301887 0.9286856   
## 381 <{5803},   
## {6201}> => <{5801}> 0.6666667 0.8301887 0.9286856   
## 382 <{6202},   
## {5803}> => <{5801}> 0.6666667 0.8301887 0.9286856   
## 383 <{6001},   
## {5802}> => <{5801}> 0.6666667 0.8301887 0.9286856   
## 384 <{5803},   
## {6201}> => <{3302}> 0.6666667 0.8301887 0.9784367   
## 385 <{5801},   
## {5803}> => <{3302}> 0.6666667 0.8301887 0.9784367   
## 386 <{5803},   
## {6003}> => <{6203}> 0.5909091 0.8297872 0.9442406   
## 387 <{5803},   
## {6003}> => <{6201}> 0.5909091 0.8297872 0.9282366   
## 388 <{5803},   
## {6003}> => <{6003}> 0.5909091 0.8297872 1.0333200   
## 389 <{5801},   
## {6002}> => <{5801}> 0.5909091 0.8297872 0.9282366   
## 390 <{5803},   
## {6001}> => <{3302}> 0.5909091 0.8297872 0.9779635   
## 391 <{6003},   
## {6003}> => <{6001}> 0.5151515 0.8292683 0.9951220   
## 392 <{3302},   
## {6001}> => <{6001}> 0.5151515 0.8292683 0.9951220   
## 393 <{3303}> => <{5801}> 0.5151515 0.8292683 0.9276561   
## 394 <{3302},   
## {6001}> => <{5801}> 0.5151515 0.8292683 0.9276561   
## 395 <{6003},   
## {6003}> => <{3302}> 0.5151515 0.8292683 0.9773519   
## 396 <{6203}> => <{6001}> 0.7272727 0.8275862 0.9931034   
## 397 <{6201},   
## {6201}> => <{5803}> 0.6515152 0.8269231 0.9745879   
## 398 <{6201},   
## {6201}> => <{5801}> 0.6515152 0.8269231 0.9250326   
## 399 <{6202},   
## {3302}> => <{6203}> 0.5757576 0.8260870 0.9400300   
## 400 <{3302},   
## {6202}> => <{5801}> 0.5757576 0.8260870 0.9240973   
## 401 <{3301},   
## {6202}> => <{5803}> 0.5000000 0.8250000 0.9723214   
## 402 <{6401}> => <{5802}> 0.5000000 0.8250000 0.9228814   
## 403 <{3301},   
## {6001}> => <{3302}> 0.5000000 0.8250000 0.9723214   
## 404 <{6202},   
## {5802}> => <{6203}> 0.6363636 0.8235294 0.9371197   
## 405 <{6202},   
## {5801}> => <{6203}> 0.6363636 0.8235294 0.9371197   
## 406 <{6001},   
## {6203}> => <{6201}> 0.6363636 0.8235294 0.9212363   
## 407 <{6202},   
## {5802}> => <{6201}> 0.6363636 0.8235294 0.9212363   
## 408 <{6202},   
## {5802}> => <{5802}> 0.6363636 0.8235294 0.9212363   
## 409 <{5802},   
## {6001}> => <{5801}> 0.6363636 0.8235294 0.9212363   
## 410 <{6001},   
## {6202}> => <{6203}> 0.5606061 0.8222222 0.9356322   
## 411 <{3301},   
## {5803}> => <{6203}> 0.5606061 0.8222222 0.9356322   
## 412 <{3301},   
## {5803}> => <{6201}> 0.5606061 0.8222222 0.9197740   
## 413 <{6003},   
## {5801}> => <{5802}> 0.5606061 0.8222222 0.9197740   
## 414 <{5803},   
## {3301}> => <{5801}> 0.5606061 0.8222222 0.9197740   
## 415 <{6003},   
## {6203}> => <{3302}> 0.5606061 0.8222222 0.9690476   
## 416 <{3302}> => <{6202}> 0.6969697 0.8214286 0.9347291   
## 417 <{6203},   
## {6203}> => <{6203}> 0.6212121 0.8200000 0.9331034   
## 418 <{5802},   
## {6002}> => <{5803}> 0.6212121 0.8200000 0.9664286   
## 419 <{5801},   
## {6202}> => <{5802}> 0.6212121 0.8200000 0.9172881   
## 420 <{3302},   
## {6203}> => <{5801}> 0.6212121 0.8200000 0.9172881   
## 421 <{5803},   
## {6202}> => <{3302}> 0.6212121 0.8200000 0.9664286   
## 422 <{5803},   
## {6203}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 423 <{6201},   
## {6203}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 424 <{5802},   
## {6201}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 425 <{5802},   
## {5801}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 426 <{6001}> => <{6202}> 0.6818182 0.8181818 0.9310345   
## 427 <{5803},   
## {5802}> => <{6201}> 0.6818182 0.8181818 0.9152542   
## 428 <{5802},   
## {6201}> => <{5802}> 0.6818182 0.8181818 0.9152542   
## 429 <{6201},   
## {5801}> => <{5801}> 0.6818182 0.8181818 0.9152542   
## 430 <{5803},   
## {6203}> => <{3302}> 0.6818182 0.8181818 0.9642857   
## 431 <{5802},   
## {6201}> => <{3302}> 0.6818182 0.8181818 0.9642857   
## 432 <{6202},   
## {6002}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 433 <{6202},   
## {6001}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 434 <{6002},   
## {5802}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 435 <{6202},   
## {6001}> => <{6202}> 0.5454545 0.8181818 0.9310345   
## 436 <{6001},   
## {6003}> => <{6201}> 0.5454545 0.8181818 0.9152542   
## 437 <{6202},   
## {6002}> => <{5801}> 0.5454545 0.8181818 0.9152542   
## 438 <{6202},   
## {6001}> => <{5801}> 0.5454545 0.8181818 0.9152542   
## 439 <{6001},   
## {3302}> => <{5801}> 0.5454545 0.8181818 0.9152542   
## 440 <{3302},   
## {6002}> => <{3302}> 0.5454545 0.8181818 0.9642857   
## 441 <{6201},   
## {3301}> => <{3302}> 0.5454545 0.8181818 0.9642857   
## 442 <{6001},   
## {5803}> => <{6002}> 0.6060606 0.8163265 1.0165576   
## 443 <{5801},   
## {6001}> => <{6001}> 0.6060606 0.8163265 0.9795918   
## 444 <{6001},   
## {5803}> => <{6001}> 0.6060606 0.8163265 0.9795918   
## 445 <{5802},   
## {6003}> => <{5803}> 0.6060606 0.8163265 0.9620991   
## 446 <{6001},   
## {5801}> => <{5803}> 0.6060606 0.8163265 0.9620991   
## 447 <{6003},   
## {6201}> => <{5802}> 0.6060606 0.8163265 0.9131788   
## 448 <{5802},   
## {6003}> => <{5802}> 0.6060606 0.8163265 0.9131788   
## 449 <{6203},   
## {6003}> => <{5801}> 0.6060606 0.8163265 0.9131788   
## 450 <{6001},   
## {5803}> => <{5801}> 0.6060606 0.8163265 0.9131788   
## 451 <{5802},   
## {5803}> => <{6203}> 0.6666667 0.8148148 0.9272031   
## 452 <{6201},   
## {5802}> => <{5803}> 0.6666667 0.8148148 0.9603175   
## 453 <{6203},   
## {6201}> => <{3302}> 0.6666667 0.8148148 0.9603175   
## 454 <{6201},   
## {5802}> => <{3302}> 0.6666667 0.8148148 0.9603175   
## 455 <{5803},   
## {5801}> => <{3302}> 0.6666667 0.8148148 0.9603175   
## 456 <{6003},   
## {6202}> => <{6201}> 0.5303030 0.8139535 0.9105242   
## 457 <{3302},   
## {6003}> => <{6003}> 0.5303030 0.8139535 1.0136025   
## 458 <{6003},   
## {6202}> => <{5803}> 0.5303030 0.8139535 0.9593023   
## 459 <{5801},   
## {6003}> => <{5803}> 0.5303030 0.8139535 0.9593023   
## 460 <{6003},   
## {6202}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 461 <{3301},   
## {6201}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 462 <{5801},   
## {6003}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 463 <{6001},   
## {6002}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 464 <{6201}> => <{6003}> 0.7272727 0.8135593 1.0131116   
## 465 <{5801}> => <{3302}> 0.7272727 0.8135593 0.9588378   
## 466 <{6201}> => <{3302}> 0.7272727 0.8135593 0.9588378   
## 467 <{6003},   
## {5803}> => <{6003}> 0.5909091 0.8125000 1.0117925   
## 468 <{3302},   
## {5802}> => <{6003}> 0.5909091 0.8125000 1.0117925   
## 469 <{6001},   
## {6001}> => <{5803}> 0.5909091 0.8125000 0.9575893   
## 470 <{6001},   
## {6001}> => <{5802}> 0.5909091 0.8125000 0.9088983   
## 471 <{6003},   
## {5803}> => <{5802}> 0.5909091 0.8125000 0.9088983   
## 472 <{3301},   
## {3302}> => <{5802}> 0.5909091 0.8125000 0.9088983   
## 473 <{6002},   
## {6203}> => <{5801}> 0.5909091 0.8125000 0.9088983   
## 474 <{6003},   
## {5803}> => <{5801}> 0.5909091 0.8125000 0.9088983   
## 475 <{6003},   
## {5803}> => <{3302}> 0.5909091 0.8125000 0.9575893   
## 476 <{6003}> => <{6202}> 0.6515152 0.8113208 0.9232271   
## 477 <{5803},   
## {6201}> => <{6201}> 0.6515152 0.8113208 0.9075791   
## 478 <{6001},   
## {5802}> => <{5803}> 0.6515152 0.8113208 0.9561995   
## 479 <{5801},   
## {5803}> => <{5801}> 0.6515152 0.8113208 0.9075791   
## 480 <{5801},   
## {5802}> => <{5801}> 0.6515152 0.8113208 0.9075791   
## 481 <{5801},   
## {6201}> => <{3302}> 0.6515152 0.8113208 0.9561995   
## 482 <{6001},   
## {5802}> => <{3302}> 0.6515152 0.8113208 0.9561995   
## 483 <{6202}> => <{6203}> 0.7121212 0.8103448 0.9221165   
## 484 <{6002},   
## {3302}> => <{6203}> 0.5151515 0.8095238 0.9211823   
## 485 <{6001},   
## {3301}> => <{6203}> 0.5151515 0.8095238 0.9211823   
## 486 <{6003},   
## {3302}> => <{6002}> 0.5151515 0.8095238 1.0080863   
## 487 <{6002},   
## {3302}> => <{5802}> 0.5151515 0.8095238 0.9055690   
## 488 <{3302},   
## {3301}> => <{6203}> 0.5757576 0.8085106 0.9200293   
## 489 <{3301},   
## {5802}> => <{6201}> 0.5757576 0.8085106 0.9044356   
## 490 <{3302},   
## {6201}> => <{6001}> 0.5757576 0.8085106 0.9702128   
## 491 <{6202},   
## {6203}> => <{5802}> 0.5757576 0.8085106 0.9044356   
## 492 <{5803},   
## {6003}> => <{5802}> 0.5757576 0.8085106 0.9044356   
## 493 <{6001},   
## {6201}> => <{6001}> 0.6363636 0.8076923 0.9692308   
## 494 <{6001},   
## {6201}> => <{5803}> 0.6363636 0.8076923 0.9519231   
## 495 <{3303}> => <{6203}> 0.5000000 0.8048780 0.9158957   
## 496 <{6003},   
## {6003}> => <{6203}> 0.5000000 0.8048780 0.9158957   
## 497 <{6202},   
## {6003}> => <{6202}> 0.5000000 0.8048780 0.9158957   
## 498 <{3303}> => <{5803}> 0.5000000 0.8048780 0.9486063   
## 499 <{3303}> => <{5802}> 0.5000000 0.8048780 0.9003721   
## 500 <{6003},   
## {6003}> => <{5801}> 0.5000000 0.8048780 0.9003721   
## 501 <{3302},   
## {6001}> => <{3301}> 0.5000000 0.8048780 0.9837398   
## 502 <{3302},   
## {6202}> => <{6203}> 0.5606061 0.8043478 0.9152924   
## 503 <{6003},   
## {6001}> => <{6201}> 0.5606061 0.8043478 0.8997789   
## 504 <{6202},   
## {3302}> => <{5801}> 0.5606061 0.8043478 0.8997789   
## 505 <{5802},   
## {6202}> => <{6203}> 0.6212121 0.8039216 0.9148073   
## 506 <{3302},   
## {3302}> => <{6203}> 0.6212121 0.8039216 0.9148073   
## 507 <{5802},   
## {6202}> => <{5803}> 0.6212121 0.8039216 0.9474790   
## 508 <{5802},   
## {6202}> => <{5802}> 0.6212121 0.8039216 0.8993021   
## 509 <{5803}> => <{6002}> 0.6818182 0.8035714 1.0006739   
## 510 <{5803}> => <{3301}> 0.6818182 0.8035714 0.9821429   
## 511 <{5801},   
## {5801}> => <{6203}> 0.6060606 0.8000000 0.9103448   
## 512 <{6201},   
## {6202}> => <{5803}> 0.6060606 0.8000000 0.9428571   
## 513 <{5801},   
## {5801}> => <{5802}> 0.6060606 0.8000000 0.8949153   
## 514 <{5801},   
## {6203}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 515 <{6203},   
## {6203}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 516 <{5803},   
## {6202}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 517 <{5802},   
## {6002}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 518 <{6003},   
## {5802}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 519 <{5801},   
## {5801}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 520 <{3302},   
## {6203}> => <{3302}> 0.6060606 0.8000000 0.9428571   
## 521 <{5801},   
## {6203}> => <{3302}> 0.6060606 0.8000000 0.9428571   
## 522 <{6203},   
## {6002}> => <{6202}> 0.5454545 0.8000000 0.9103448   
## 523 <{6003},   
## {6002}> => <{6201}> 0.5454545 0.8000000 0.8949153   
## 524 <{6002},   
## {5803}> => <{6003}> 0.5454545 0.8000000 0.9962264   
## 525 <{6003},   
## {6203}> => <{6001}> 0.5454545 0.8000000 0.9600000   
## 526 <{6002},   
## {5803}> => <{6001}> 0.5454545 0.8000000 0.9600000   
## 527 <{6002},   
## {6202}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 528 <{6202},   
## {6202}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 529 <{6003},   
## {6002}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 530 <{3301},   
## {5803}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 531 <{6002},   
## {5803}> => <{5801}> 0.5454545 0.8000000 0.8949153   
##

inspect(head(sort(seqRules, by=c("support", "confidence")),531))

## lhs rhs support confidence lift   
## 1 <{5803}> => <{6203}> 0.8333333 0.9821429 1.1176108   
## 2 <{5803}> => <{5803}> 0.8333333 0.9821429 1.1575255   
## 3 <{5803}> => <{5802}> 0.8333333 0.9821429 1.0986683   
## 4 <{6203}> => <{5802}> 0.8333333 0.9482759 1.0607832   
## 5 <{6201}> => <{6203}> 0.8333333 0.9322034 1.0607832   
## 6 <{5802}> => <{6201}> 0.8333333 0.9322034 1.0428038   
## 7 <{6201}> => <{5803}> 0.8333333 0.9322034 1.0986683   
## 8 <{5802}> => <{5802}> 0.8333333 0.9322034 1.0428038   
## 9 <{5802}> => <{5801}> 0.8333333 0.9322034 1.0428038   
## 10 <{6201}> => <{5801}> 0.8333333 0.9322034 1.0428038   
## 11 <{5803}> => <{5801}> 0.8181818 0.9642857 1.0786925   
## 12 <{6203}> => <{6201}> 0.8181818 0.9310345 1.0414962   
## 13 <{6203}> => <{5803}> 0.8181818 0.9310345 1.0972906   
## 14 <{5802}> => <{6203}> 0.8181818 0.9152542 1.0414962   
## 15 <{5802}> => <{5803}> 0.8181818 0.9152542 1.0786925   
## 16 <{6201}> => <{5802}> 0.8181818 0.9152542 1.0238437   
## 17 <{6001}> => <{5802}> 0.8030303 0.9636364 1.0779661   
## 18 <{5803}> => <{6201}> 0.8030303 0.9464286 1.0587167   
## 19 <{6202}> => <{5803}> 0.8030303 0.9137931 1.0769704   
## 20 <{5801}> => <{6201}> 0.8030303 0.8983051 1.0048837   
## 21 <{5801}> => <{5803}> 0.8030303 0.8983051 1.0587167   
## 22 <{5801}> => <{5802}> 0.8030303 0.8983051 1.0048837   
## 23 <{6001}> => <{6201}> 0.7878788 0.9454545 1.0576271   
## 24 <{6203}> => <{5801}> 0.7878788 0.8965517 1.0029223   
## 25 <{6201}> => <{6201}> 0.7878788 0.8813559 0.9859236   
## 26 <{5802},   
## {6203}> => <{5802}> 0.7727273 0.9444444 1.0564972   
## 27 <{6001}> => <{6203}> 0.7727273 0.9272727 1.0551724   
## 28 <{5803},   
## {6203}> => <{5803}> 0.7727273 0.9272727 1.0928571   
## 29 <{3302}> => <{3302}> 0.7727273 0.9107143 1.0733418   
## 30 <{6202}> => <{6201}> 0.7727273 0.8793103 0.9836353   
## 31 <{6202}> => <{5802}> 0.7727273 0.8793103 0.9836353   
## 32 <{6202}> => <{5801}> 0.7727273 0.8793103 0.9836353   
## 33 <{6203}> => <{3302}> 0.7727273 0.8793103 1.0363300   
## 34 <{5802}> => <{6202}> 0.7727273 0.8644068 0.9836353   
## 35 <{5802}> => <{6001}> 0.7727273 0.8644068 1.0372881   
## 36 <{6003}> => <{5802}> 0.7575758 0.9433962 1.0553246   
## 37 <{5802},   
## {6201}> => <{5803}> 0.7575758 0.9090909 1.0714286   
## 38 <{6203},   
## {5802}> => <{5801}> 0.7575758 0.9090909 1.0169492   
## 39 <{3302}> => <{6203}> 0.7575758 0.8928571 1.0160099   
## 40 <{5803}> => <{6202}> 0.7575758 0.8928571 1.0160099   
## 41 <{3302}> => <{5803}> 0.7575758 0.8928571 1.0522959   
## 42 <{6203}> => <{6203}> 0.7575758 0.8620690 0.9809750   
## 43 <{6203}> => <{6202}> 0.7575758 0.8620690 0.9809750   
## 44 <{5801}> => <{6203}> 0.7575758 0.8474576 0.9643483   
## 45 <{5801}> => <{6202}> 0.7575758 0.8474576 0.9643483   
## 46 <{6201}> => <{6202}> 0.7575758 0.8474576 0.9643483   
## 47 <{5802}> => <{6002}> 0.7575758 0.8474576 1.0553246   
## 48 <{5801}> => <{5801}> 0.7575758 0.8474576 0.9480034   
## 49 <{5802}> => <{3302}> 0.7575758 0.8474576 0.9987893   
## 50 <{6203},   
## {5801}> => <{6201}> 0.7424242 0.9423077 1.0541069   
## 51 <{6003}> => <{6201}> 0.7424242 0.9245283 1.0342181   
## 52 <{5802},   
## {6203}> => <{5803}> 0.7424242 0.9074074 1.0694444   
## 53 <{5802},   
## {5803}> => <{5803}> 0.7424242 0.9074074 1.0694444   
## 54 <{6203},   
## {5803}> => <{5803}> 0.7424242 0.9074074 1.0694444   
## 55 <{6203},   
## {5803}> => <{5802}> 0.7424242 0.9074074 1.0150659   
## 56 <{6201},   
## {5802}> => <{5801}> 0.7424242 0.9074074 1.0150659   
## 57 <{6001}> => <{5803}> 0.7424242 0.8909091 1.0500000   
## 58 <{5803},   
## {6203}> => <{5802}> 0.7424242 0.8909091 0.9966102   
## 59 <{6201},   
## {6203}> => <{5802}> 0.7424242 0.8909091 0.9966102   
## 60 <{6001}> => <{5801}> 0.7424242 0.8909091 0.9966102   
## 61 <{5803}> => <{3302}> 0.7424242 0.8750000 1.0312500   
## 62 <{6203}> => <{6003}> 0.7424242 0.8448276 1.0520494   
## 63 <{5802}> => <{6003}> 0.7424242 0.8305085 1.0342181   
## 64 <{5801}> => <{6001}> 0.7424242 0.8305085 0.9966102   
## 65 <{6201}> => <{6001}> 0.7424242 0.8305085 0.9966102   
## 66 <{6001},   
## {6203}> => <{5802}> 0.7272727 0.9411765 1.0528415   
## 67 <{6002}> => <{6203}> 0.7272727 0.9056604 1.0305791   
## 68 <{6002}> => <{6001}> 0.7272727 0.9056604 1.0867925   
## 69 <{6003}> => <{5803}> 0.7272727 0.9056604 1.0673854   
## 70 <{5801},   
## {6201}> => <{5802}> 0.7272727 0.9056604 1.0131116   
## 71 <{5803},   
## {6201}> => <{5802}> 0.7272727 0.9056604 1.0131116   
## 72 <{6002}> => <{5801}> 0.7272727 0.9056604 1.0131116   
## 73 <{6203},   
## {6201}> => <{5803}> 0.7272727 0.8888889 1.0476190   
## 74 <{6203},   
## {6201}> => <{5802}> 0.7272727 0.8888889 0.9943503   
## 75 <{5802},   
## {6203}> => <{5801}> 0.7272727 0.8888889 0.9943503   
## 76 <{3301}> => <{3302}> 0.7272727 0.8888889 1.0476190   
## 77 <{5802},   
## {6203}> => <{3302}> 0.7272727 0.8888889 1.0476190   
## 78 <{6201},   
## {5803}> => <{6203}> 0.7272727 0.8727273 0.9931034   
## 79 <{6001}> => <{6001}> 0.7272727 0.8727273 1.0472727   
## 80 <{6201},   
## {5803}> => <{5803}> 0.7272727 0.8727273 1.0285714   
## 81 <{6203},   
## {5802}> => <{5803}> 0.7272727 0.8727273 1.0285714   
## 82 <{5803},   
## {6203}> => <{5801}> 0.7272727 0.8727273 0.9762712   
## 83 <{5802},   
## {6201}> => <{5801}> 0.7272727 0.8727273 0.9762712   
## 84 <{3302}> => <{5802}> 0.7272727 0.8571429 0.9588378   
## 85 <{3302}> => <{5801}> 0.7272727 0.8571429 0.9588378   
## 86 <{6203}> => <{6001}> 0.7272727 0.8275862 0.9931034   
## 87 <{6201}> => <{6003}> 0.7272727 0.8135593 1.0131116   
## 88 <{5801}> => <{3302}> 0.7272727 0.8135593 0.9588378   
## 89 <{6201}> => <{3302}> 0.7272727 0.8135593 0.9588378   
## 90 <{5802},   
## {3302}> => <{5803}> 0.7121212 0.9400000 1.1078571   
## 91 <{6203},   
## {3302}> => <{5803}> 0.7121212 0.9215686 1.0861345   
## 92 <{6203},   
## {5801}> => <{5803}> 0.7121212 0.9038462 1.0652473   
## 93 <{6002}> => <{6201}> 0.7121212 0.8867925 0.9920051   
## 94 <{5801},   
## {5802}> => <{6201}> 0.7121212 0.8867925 0.9920051   
## 95 <{5801},   
## {6201}> => <{5803}> 0.7121212 0.8867925 1.0451482   
## 96 <{5803},   
## {6201}> => <{5803}> 0.7121212 0.8867925 1.0451482   
## 97 <{5802},   
## {6203}> => <{6201}> 0.7121212 0.8703704 0.9736347   
## 98 <{3301}> => <{5802}> 0.7121212 0.8703704 0.9736347   
## 99 <{6203},   
## {5803}> => <{3302}> 0.7121212 0.8703704 1.0257937   
## 100 <{5803},   
## {5803}> => <{6203}> 0.7121212 0.8545455 0.9724138   
## 101 <{5803},   
## {5802}> => <{6203}> 0.7121212 0.8545455 0.9724138   
## 102 <{5803},   
## {6203}> => <{6201}> 0.7121212 0.8545455 0.9559322   
## 103 <{5803},   
## {5803}> => <{6201}> 0.7121212 0.8545455 0.9559322   
## 104 <{6201},   
## {6203}> => <{5803}> 0.7121212 0.8545455 1.0071429   
## 105 <{5803},   
## {5803}> => <{5802}> 0.7121212 0.8545455 0.9559322   
## 106 <{6201},   
## {5803}> => <{5802}> 0.7121212 0.8545455 0.9559322   
## 107 <{5803},   
## {5802}> => <{5801}> 0.7121212 0.8545455 0.9559322   
## 108 <{6201},   
## {5803}> => <{3302}> 0.7121212 0.8545455 1.0071429   
## 109 <{3302}> => <{6201}> 0.7121212 0.8392857 0.9388620   
## 110 <{5803}> => <{6003}> 0.7121212 0.8392857 1.0451482   
## 111 <{5803}> => <{6001}> 0.7121212 0.8392857 1.0071429   
## 112 <{3302}> => <{3301}> 0.7121212 0.8392857 1.0257937   
## 113 <{6202}> => <{6203}> 0.7121212 0.8103448 0.9221165   
## 114 <{5803},   
## {6001}> => <{5802}> 0.6969697 0.9787234 1.0948431   
## 115 <{6001},   
## {5803}> => <{6203}> 0.6969697 0.9387755 1.0682618   
## 116 <{5801},   
## {6001}> => <{6201}> 0.6969697 0.9387755 1.0501557   
## 117 <{6001},   
## {5803}> => <{5802}> 0.6969697 0.9387755 1.0501557   
## 118 <{5803},   
## {3302}> => <{5801}> 0.6969697 0.9387755 1.0501557   
## 119 <{3302},   
## {5803}> => <{6203}> 0.6969697 0.9200000 1.0468966   
## 120 <{5801},   
## {5801}> => <{6201}> 0.6969697 0.9200000 1.0291525   
## 121 <{5802},   
## {3302}> => <{5802}> 0.6969697 0.9200000 1.0291525   
## 122 <{3302},   
## {5803}> => <{5801}> 0.6969697 0.9200000 1.0291525   
## 123 <{3302},   
## {5803}> => <{3302}> 0.6969697 0.9200000 1.0842857   
## 124 <{5802},   
## {6001}> => <{6203}> 0.6969697 0.9019608 1.0263692   
## 125 <{3302},   
## {3302}> => <{5801}> 0.6969697 0.9019608 1.0089731   
## 126 <{3302},   
## {3302}> => <{3302}> 0.6969697 0.9019608 1.0630252   
## 127 <{6001},   
## {6201}> => <{5802}> 0.6969697 0.8846154 0.9895698   
## 128 <{5801},   
## {6201}> => <{6203}> 0.6969697 0.8679245 0.9876383   
## 129 <{5801},   
## {5803}> => <{6203}> 0.6969697 0.8679245 0.9876383   
## 130 <{6001},   
## {5802}> => <{6201}> 0.6969697 0.8679245 0.9708986   
## 131 <{6003}> => <{6001}> 0.6969697 0.8679245 1.0415094   
## 132 <{5801},   
## {5803}> => <{5802}> 0.6969697 0.8679245 0.9708986   
## 133 <{5801},   
## {6201}> => <{5801}> 0.6969697 0.8679245 0.9708986   
## 134 <{6201},   
## {5802}> => <{6203}> 0.6969697 0.8518519 0.9693487   
## 135 <{6203},   
## {5803}> => <{6201}> 0.6969697 0.8518519 0.9529190   
## 136 <{6203},   
## {5802}> => <{6201}> 0.6969697 0.8363636 0.9355932   
## 137 <{5802},   
## {5801}> => <{6201}> 0.6969697 0.8363636 0.9355932   
## 138 <{6203},   
## {5802}> => <{3302}> 0.6969697 0.8363636 0.9857143   
## 139 <{3302}> => <{6202}> 0.6969697 0.8214286 0.9347291   
## 140 <{3302},   
## {6201}> => <{3302}> 0.6818182 0.9574468 1.1284195   
## 141 <{3302},   
## {5802}> => <{5803}> 0.6818182 0.9375000 1.1049107   
## 142 <{6201},   
## {3302}> => <{5803}> 0.6818182 0.9375000 1.1049107   
## 143 <{6201},   
## {3302}> => <{5801}> 0.6818182 0.9375000 1.0487288   
## 144 <{3302},   
## {5802}> => <{3302}> 0.6818182 0.9375000 1.1049107   
## 145 <{5801},   
## {6001}> => <{5802}> 0.6818182 0.9183673 1.0273262   
## 146 <{6201},   
## {6001}> => <{5802}> 0.6818182 0.9183673 1.0273262   
## 147 <{5803},   
## {3302}> => <{5802}> 0.6818182 0.9183673 1.0273262   
## 148 <{6003},   
## {6201}> => <{5801}> 0.6818182 0.9183673 1.0273262   
## 149 <{5802},   
## {3302}> => <{6201}> 0.6818182 0.9000000 1.0067797   
## 150 <{3302},   
## {6203}> => <{5803}> 0.6818182 0.9000000 1.0607143   
## 151 <{6203},   
## {6203}> => <{5803}> 0.6818182 0.9000000 1.0607143   
## 152 <{5801},   
## {6203}> => <{5802}> 0.6818182 0.9000000 1.0067797   
## 153 <{3302},   
## {5803}> => <{5802}> 0.6818182 0.9000000 1.0067797   
## 154 <{5801},   
## {6202}> => <{5801}> 0.6818182 0.9000000 1.0067797   
## 155 <{5802},   
## {3302}> => <{5801}> 0.6818182 0.9000000 1.0067797   
## 156 <{3302},   
## {3302}> => <{6201}> 0.6818182 0.8823529 0.9870389   
## 157 <{3302},   
## {3302}> => <{5803}> 0.6818182 0.8823529 1.0399160   
## 158 <{6203},   
## {5801}> => <{5802}> 0.6818182 0.8653846 0.9680574   
## 159 <{6003}> => <{6203}> 0.6818182 0.8490566 0.9661679   
## 160 <{6002}> => <{6202}> 0.6818182 0.8490566 0.9661679   
## 161 <{5801},   
## {5803}> => <{6201}> 0.6818182 0.8490566 0.9497921   
## 162 <{6003}> => <{6002}> 0.6818182 0.8490566 1.0573158   
## 163 <{6002}> => <{5803}> 0.6818182 0.8490566 1.0006739   
## 164 <{6003}> => <{5801}> 0.6818182 0.8490566 0.9497921   
## 165 <{6203},   
## {5803}> => <{6203}> 0.6818182 0.8333333 0.9482759   
## 166 <{5803},   
## {5801}> => <{6201}> 0.6818182 0.8333333 0.9322034   
## 167 <{3301}> => <{5803}> 0.6818182 0.8333333 0.9821429   
## 168 <{5803},   
## {5801}> => <{5802}> 0.6818182 0.8333333 0.9322034   
## 169 <{6203},   
## {6201}> => <{5801}> 0.6818182 0.8333333 0.9322034   
## 170 <{5803},   
## {6203}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 171 <{6201},   
## {6203}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 172 <{5802},   
## {6201}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 173 <{5802},   
## {5801}> => <{6203}> 0.6818182 0.8181818 0.9310345   
## 174 <{6001}> => <{6202}> 0.6818182 0.8181818 0.9310345   
## 175 <{5803},   
## {5802}> => <{6201}> 0.6818182 0.8181818 0.9152542   
## 176 <{5802},   
## {6201}> => <{5802}> 0.6818182 0.8181818 0.9152542   
## 177 <{6201},   
## {5801}> => <{5801}> 0.6818182 0.8181818 0.9152542   
## 178 <{5803},   
## {6203}> => <{3302}> 0.6818182 0.8181818 0.9642857   
## 179 <{5802},   
## {6201}> => <{3302}> 0.6818182 0.8181818 0.9642857   
## 180 <{5803}> => <{6002}> 0.6818182 0.8035714 1.0006739   
## 181 <{5803}> => <{3301}> 0.6818182 0.8035714 0.9821429   
## 182 <{3302},   
## {6201}> => <{5803}> 0.6666667 0.9361702 1.1033435   
## 183 <{6203},   
## {6001}> => <{6201}> 0.6666667 0.9166667 1.0254237   
## 184 <{3302},   
## {5802}> => <{6201}> 0.6666667 0.9166667 1.0254237   
## 185 <{3302},   
## {5801}> => <{5803}> 0.6666667 0.9166667 1.0803571   
## 186 <{6203},   
## {6001}> => <{5802}> 0.6666667 0.9166667 1.0254237   
## 187 <{5801},   
## {3302}> => <{3302}> 0.6666667 0.9166667 1.0803571   
## 188 <{6201},   
## {3302}> => <{3302}> 0.6666667 0.9166667 1.0803571   
## 189 <{5803},   
## {3302}> => <{6201}> 0.6666667 0.8979592 1.0044967   
## 190 <{5803},   
## {3302}> => <{5803}> 0.6666667 0.8979592 1.0583090   
## 191 <{5803},   
## {3302}> => <{3302}> 0.6666667 0.8979592 1.0583090   
## 192 <{5801},   
## {6203}> => <{6201}> 0.6666667 0.8800000 0.9844068   
## 193 <{3302},   
## {5803}> => <{6201}> 0.6666667 0.8800000 0.9844068   
## 194 <{5801},   
## {6203}> => <{5803}> 0.6666667 0.8800000 1.0371429   
## 195 <{5803},   
## {6202}> => <{5803}> 0.6666667 0.8800000 1.0371429   
## 196 <{3302},   
## {5803}> => <{5803}> 0.6666667 0.8800000 1.0371429   
## 197 <{5802},   
## {3302}> => <{3302}> 0.6666667 0.8800000 1.0371429   
## 198 <{6203},   
## {3302}> => <{6201}> 0.6666667 0.8627451 0.9651047   
## 199 <{6001},   
## {6203}> => <{5803}> 0.6666667 0.8627451 1.0168067   
## 200 <{6203},   
## {3302}> => <{5802}> 0.6666667 0.8627451 0.9651047   
## 201 <{5801},   
## {6201}> => <{6001}> 0.6666667 0.8301887 0.9962264   
## 202 <{6002}> => <{5802}> 0.6666667 0.8301887 0.9286856   
## 203 <{5803},   
## {6201}> => <{5801}> 0.6666667 0.8301887 0.9286856   
## 204 <{6202},   
## {5803}> => <{5801}> 0.6666667 0.8301887 0.9286856   
## 205 <{6001},   
## {5802}> => <{5801}> 0.6666667 0.8301887 0.9286856   
## 206 <{5803},   
## {6201}> => <{3302}> 0.6666667 0.8301887 0.9784367   
## 207 <{5801},   
## {5803}> => <{3302}> 0.6666667 0.8301887 0.9784367   
## 208 <{5802},   
## {5803}> => <{6203}> 0.6666667 0.8148148 0.9272031   
## 209 <{6201},   
## {5802}> => <{5803}> 0.6666667 0.8148148 0.9603175   
## 210 <{6203},   
## {6201}> => <{3302}> 0.6666667 0.8148148 0.9603175   
## 211 <{6201},   
## {5802}> => <{3302}> 0.6666667 0.8148148 0.9603175   
## 212 <{5803},   
## {5801}> => <{3302}> 0.6666667 0.8148148 0.9603175   
## 213 <{6202},   
## {3302}> => <{3302}> 0.6515152 0.9347826 1.1017081   
## 214 <{5803},   
## {6001}> => <{6201}> 0.6515152 0.9148936 1.0234403   
## 215 <{5803},   
## {6003}> => <{5803}> 0.6515152 0.9148936 1.0782675   
## 216 <{3302},   
## {3301}> => <{3302}> 0.6515152 0.9148936 1.0782675   
## 217 <{6201},   
## {3302}> => <{6203}> 0.6515152 0.8958333 1.0193966   
## 218 <{5801},   
## {3302}> => <{5803}> 0.6515152 0.8958333 1.0558036   
## 219 <{3302},   
## {5802}> => <{5801}> 0.6515152 0.8958333 1.0021186   
## 220 <{3301},   
## {3302}> => <{3302}> 0.6515152 0.8958333 1.0558036   
## 221 <{6203},   
## {6003}> => <{6201}> 0.6515152 0.8775510 0.9816672   
## 222 <{6003},   
## {6201}> => <{6001}> 0.6515152 0.8775510 1.0530612   
## 223 <{5801},   
## {6001}> => <{5803}> 0.6515152 0.8775510 1.0342566   
## 224 <{6201},   
## {6001}> => <{5803}> 0.6515152 0.8775510 1.0342566   
## 225 <{6001},   
## {5803}> => <{5803}> 0.6515152 0.8775510 1.0342566   
## 226 <{6001},   
## {5803}> => <{3302}> 0.6515152 0.8775510 1.0342566   
## 227 <{3302},   
## {6203}> => <{5802}> 0.6515152 0.8600000 0.9620339   
## 228 <{6203},   
## {6203}> => <{5802}> 0.6515152 0.8600000 0.9620339   
## 229 <{6202},   
## {5801}> => <{6201}> 0.6515152 0.8431373 0.9431705   
## 230 <{5802},   
## {6001}> => <{5803}> 0.6515152 0.8431373 0.9936975   
## 231 <{3302},   
## {3302}> => <{5802}> 0.6515152 0.8431373 0.9431705   
## 232 <{6203},   
## {3302}> => <{3302}> 0.6515152 0.8431373 0.9936975   
## 233 <{6201},   
## {6201}> => <{5803}> 0.6515152 0.8269231 0.9745879   
## 234 <{6201},   
## {6201}> => <{5801}> 0.6515152 0.8269231 0.9250326   
## 235 <{6003}> => <{6202}> 0.6515152 0.8113208 0.9232271   
## 236 <{5803},   
## {6201}> => <{6201}> 0.6515152 0.8113208 0.9075791   
## 237 <{6001},   
## {5802}> => <{5803}> 0.6515152 0.8113208 0.9561995   
## 238 <{5801},   
## {5803}> => <{5801}> 0.6515152 0.8113208 0.9075791   
## 239 <{5801},   
## {5802}> => <{5801}> 0.6515152 0.8113208 0.9075791   
## 240 <{5801},   
## {6201}> => <{3302}> 0.6515152 0.8113208 0.9561995   
## 241 <{6001},   
## {5802}> => <{3302}> 0.6515152 0.8113208 0.9561995   
## 242 <{3301},   
## {5803}> => <{3302}> 0.6363636 0.9333333 1.1000000   
## 243 <{3302},   
## {6202}> => <{5803}> 0.6363636 0.9130435 1.0760870   
## 244 <{5801},   
## {6002}> => <{6001}> 0.6363636 0.8936170 1.0723404   
## 245 <{3302},   
## {3301}> => <{5803}> 0.6363636 0.8936170 1.0531915   
## 246 <{3302},   
## {6201}> => <{5802}> 0.6363636 0.8936170 0.9996394   
## 247 <{3302},   
## {6201}> => <{5801}> 0.6363636 0.8936170 0.9996394   
## 248 <{5803},   
## {6001}> => <{5801}> 0.6363636 0.8936170 0.9996394   
## 249 <{3301},   
## {5802}> => <{3302}> 0.6363636 0.8936170 1.0531915   
## 250 <{6001},   
## {6001}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 251 <{3302},   
## {5801}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 252 <{5801},   
## {3302}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 253 <{6201},   
## {3302}> => <{6201}> 0.6363636 0.8750000 0.9788136   
## 254 <{6002},   
## {5801}> => <{6001}> 0.6363636 0.8750000 1.0500000   
## 255 <{6203},   
## {6001}> => <{5803}> 0.6363636 0.8750000 1.0312500   
## 256 <{3302},   
## {5801}> => <{3302}> 0.6363636 0.8750000 1.0312500   
## 257 <{6001},   
## {5803}> => <{6003}> 0.6363636 0.8571429 1.0673854   
## 258 <{5801},   
## {6001}> => <{5801}> 0.6363636 0.8571429 0.9588378   
## 259 <{5802},   
## {3302}> => <{6203}> 0.6363636 0.8400000 0.9558621   
## 260 <{3302},   
## {6203}> => <{6201}> 0.6363636 0.8400000 0.9396610   
## 261 <{6203},   
## {6203}> => <{6201}> 0.6363636 0.8400000 0.9396610   
## 262 <{5802},   
## {6002}> => <{6001}> 0.6363636 0.8400000 1.0080000   
## 263 <{5801},   
## {5801}> => <{6001}> 0.6363636 0.8400000 1.0080000   
## 264 <{6203},   
## {6202}> => <{5803}> 0.6363636 0.8400000 0.9900000   
## 265 <{5801},   
## {5801}> => <{5803}> 0.6363636 0.8400000 0.9900000   
## 266 <{6203},   
## {6202}> => <{5801}> 0.6363636 0.8400000 0.9396610   
## 267 <{6202},   
## {5802}> => <{6203}> 0.6363636 0.8235294 0.9371197   
## 268 <{6202},   
## {5801}> => <{6203}> 0.6363636 0.8235294 0.9371197   
## 269 <{6001},   
## {6203}> => <{6201}> 0.6363636 0.8235294 0.9212363   
## 270 <{6202},   
## {5802}> => <{6201}> 0.6363636 0.8235294 0.9212363   
## 271 <{6202},   
## {5802}> => <{5802}> 0.6363636 0.8235294 0.9212363   
## 272 <{5802},   
## {6001}> => <{5801}> 0.6363636 0.8235294 0.9212363   
## 273 <{6001},   
## {6201}> => <{6001}> 0.6363636 0.8076923 0.9692308   
## 274 <{6001},   
## {6201}> => <{5803}> 0.6363636 0.8076923 0.9519231   
## 275 <{6001},   
## {3302}> => <{5803}> 0.6212121 0.9318182 1.0982143   
## 276 <{6201},   
## {6002}> => <{5801}> 0.6212121 0.9318182 1.0423729   
## 277 <{6001},   
## {3302}> => <{3302}> 0.6212121 0.9318182 1.0982143   
## 278 <{5803},   
## {3301}> => <{5802}> 0.6212121 0.9111111 1.0192090   
## 279 <{6003},   
## {6001}> => <{5802}> 0.6212121 0.8913043 0.9970523   
## 280 <{3302},   
## {6201}> => <{6201}> 0.6212121 0.8723404 0.9758384   
## 281 <{5803},   
## {6001}> => <{5803}> 0.6212121 0.8723404 1.0281155   
## 282 <{3302},   
## {3301}> => <{5802}> 0.6212121 0.8723404 0.9758384   
## 283 <{6202},   
## {6203}> => <{5801}> 0.6212121 0.8723404 0.9758384   
## 284 <{3302},   
## {5802}> => <{6203}> 0.6212121 0.8541667 0.9719828   
## 285 <{3301},   
## {3302}> => <{5803}> 0.6212121 0.8541667 1.0066964   
## 286 <{3302},   
## {5802}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 287 <{3302},   
## {5801}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 288 <{5801},   
## {3302}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 289 <{6201},   
## {3302}> => <{5802}> 0.6212121 0.8541667 0.9555085   
## 290 <{6002},   
## {6001}> => <{5801}> 0.6212121 0.8541667 0.9555085   
## 291 <{5801},   
## {3302}> => <{5801}> 0.6212121 0.8541667 0.9555085   
## 292 <{5801},   
## {6001}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 293 <{6201},   
## {6001}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 294 <{5803},   
## {3302}> => <{6203}> 0.6212121 0.8367347 0.9521464   
## 295 <{5802},   
## {6003}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 296 <{6201},   
## {6001}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 297 <{6001},   
## {5803}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 298 <{6001},   
## {5801}> => <{6201}> 0.6212121 0.8367347 0.9360083   
## 299 <{6001},   
## {5801}> => <{6001}> 0.6212121 0.8367347 1.0040816   
## 300 <{6203},   
## {6003}> => <{5803}> 0.6212121 0.8367347 0.9861516   
## 301 <{6203},   
## {6003}> => <{5802}> 0.6212121 0.8367347 0.9360083   
## 302 <{6001},   
## {5801}> => <{5802}> 0.6212121 0.8367347 0.9360083   
## 303 <{6203},   
## {6203}> => <{6203}> 0.6212121 0.8200000 0.9331034   
## 304 <{5802},   
## {6002}> => <{5803}> 0.6212121 0.8200000 0.9664286   
## 305 <{5801},   
## {6202}> => <{5802}> 0.6212121 0.8200000 0.9172881   
## 306 <{3302},   
## {6203}> => <{5801}> 0.6212121 0.8200000 0.9172881   
## 307 <{5803},   
## {6202}> => <{3302}> 0.6212121 0.8200000 0.9664286   
## 308 <{5802},   
## {6202}> => <{6203}> 0.6212121 0.8039216 0.9148073   
## 309 <{3302},   
## {3302}> => <{6203}> 0.6212121 0.8039216 0.9148073   
## 310 <{5802},   
## {6202}> => <{5803}> 0.6212121 0.8039216 0.9474790   
## 311 <{5802},   
## {6202}> => <{5802}> 0.6212121 0.8039216 0.8993021   
## 312 <{3302},   
## {6001}> => <{5802}> 0.6060606 0.9756098 1.0913601   
## 313 <{3301},   
## {6201}> => <{3302}> 0.6060606 0.9302326 1.0963455   
## 314 <{6001},   
## {3302}> => <{6201}> 0.6060606 0.9090909 1.0169492   
## 315 <{6202},   
## {6001}> => <{5802}> 0.6060606 0.9090909 1.0169492   
## 316 <{6002},   
## {5803}> => <{5803}> 0.6060606 0.8888889 1.0476190   
## 317 <{6003},   
## {6203}> => <{5802}> 0.6060606 0.8888889 0.9943503   
## 318 <{6001},   
## {6202}> => <{5802}> 0.6060606 0.8888889 0.9943503   
## 319 <{5803},   
## {3301}> => <{3302}> 0.6060606 0.8888889 1.0476190   
## 320 <{3302},   
## {6201}> => <{6203}> 0.6060606 0.8510638 0.9684519   
## 321 <{5803},   
## {6001}> => <{6203}> 0.6060606 0.8510638 0.9684519   
## 322 <{6002},   
## {6201}> => <{6001}> 0.6060606 0.8510638 1.0212766   
## 323 <{6002},   
## {6201}> => <{5801}> 0.6060606 0.8510638 0.9520375   
## 324 <{3301},   
## {5802}> => <{5801}> 0.6060606 0.8510638 0.9520375   
## 325 <{5801},   
## {3302}> => <{6203}> 0.6060606 0.8333333 0.9482759   
## 326 <{3301},   
## {3302}> => <{6201}> 0.6060606 0.8333333 0.9322034   
## 327 <{6002},   
## {5801}> => <{5803}> 0.6060606 0.8333333 0.9821429   
## 328 <{6001},   
## {5803}> => <{6002}> 0.6060606 0.8163265 1.0165576   
## 329 <{5801},   
## {6001}> => <{6001}> 0.6060606 0.8163265 0.9795918   
## 330 <{6001},   
## {5803}> => <{6001}> 0.6060606 0.8163265 0.9795918   
## 331 <{5802},   
## {6003}> => <{5803}> 0.6060606 0.8163265 0.9620991   
## 332 <{6001},   
## {5801}> => <{5803}> 0.6060606 0.8163265 0.9620991   
## 333 <{6003},   
## {6201}> => <{5802}> 0.6060606 0.8163265 0.9131788   
## 334 <{5802},   
## {6003}> => <{5802}> 0.6060606 0.8163265 0.9131788   
## 335 <{6203},   
## {6003}> => <{5801}> 0.6060606 0.8163265 0.9131788   
## 336 <{6001},   
## {5803}> => <{5801}> 0.6060606 0.8163265 0.9131788   
## 337 <{5801},   
## {5801}> => <{6203}> 0.6060606 0.8000000 0.9103448   
## 338 <{6201},   
## {6202}> => <{5803}> 0.6060606 0.8000000 0.9428571   
## 339 <{5801},   
## {5801}> => <{5802}> 0.6060606 0.8000000 0.8949153   
## 340 <{5801},   
## {6203}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 341 <{6203},   
## {6203}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 342 <{5803},   
## {6202}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 343 <{5802},   
## {6002}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 344 <{6003},   
## {5802}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 345 <{5801},   
## {5801}> => <{5801}> 0.6060606 0.8000000 0.8949153   
## 346 <{3302},   
## {6203}> => <{3302}> 0.6060606 0.8000000 0.9428571   
## 347 <{5801},   
## {6203}> => <{3302}> 0.6060606 0.8000000 0.9428571   
## 348 <{3302},   
## {6001}> => <{6201}> 0.5909091 0.9512195 1.0640761   
## 349 <{3302},   
## {6001}> => <{5803}> 0.5909091 0.9512195 1.1210801   
## 350 <{6001},   
## {3302}> => <{6002}> 0.5909091 0.8863636 1.1037736   
## 351 <{6002},   
## {5802}> => <{6001}> 0.5909091 0.8863636 1.0636364   
## 352 <{6001},   
## {6003}> => <{5802}> 0.5909091 0.8863636 0.9915254   
## 353 <{6001},   
## {3302}> => <{5802}> 0.5909091 0.8863636 0.9915254   
## 354 <{6201},   
## {3301}> => <{5802}> 0.5909091 0.8863636 0.9915254   
## 355 <{6003},   
## {5801}> => <{6001}> 0.5909091 0.8666667 1.0400000   
## 356 <{6203},   
## {6002}> => <{5803}> 0.5909091 0.8666667 1.0214286   
## 357 <{6002},   
## {6202}> => <{5802}> 0.5909091 0.8666667 0.9694915   
## 358 <{3301},   
## {5803}> => <{5802}> 0.5909091 0.8666667 0.9694915   
## 359 <{6202},   
## {3302}> => <{6201}> 0.5909091 0.8478261 0.9484156   
## 360 <{6202},   
## {3302}> => <{5803}> 0.5909091 0.8478261 0.9992236   
## 361 <{5802},   
## {3301}> => <{5803}> 0.5909091 0.8478261 0.9992236   
## 362 <{6202},   
## {3302}> => <{5802}> 0.5909091 0.8478261 0.9484156   
## 363 <{3302},   
## {6202}> => <{3302}> 0.5909091 0.8478261 0.9992236   
## 364 <{5802},   
## {3301}> => <{3302}> 0.5909091 0.8478261 0.9992236   
## 365 <{5803},   
## {6003}> => <{6203}> 0.5909091 0.8297872 0.9442406   
## 366 <{5803},   
## {6003}> => <{6201}> 0.5909091 0.8297872 0.9282366   
## 367 <{5803},   
## {6003}> => <{6003}> 0.5909091 0.8297872 1.0333200   
## 368 <{5801},   
## {6002}> => <{5801}> 0.5909091 0.8297872 0.9282366   
## 369 <{5803},   
## {6001}> => <{3302}> 0.5909091 0.8297872 0.9779635   
## 370 <{6003},   
## {5803}> => <{6003}> 0.5909091 0.8125000 1.0117925   
## 371 <{3302},   
## {5802}> => <{6003}> 0.5909091 0.8125000 1.0117925   
## 372 <{6001},   
## {6001}> => <{5803}> 0.5909091 0.8125000 0.9575893   
## 373 <{6001},   
## {6001}> => <{5802}> 0.5909091 0.8125000 0.9088983   
## 374 <{6003},   
## {5803}> => <{5802}> 0.5909091 0.8125000 0.9088983   
## 375 <{3301},   
## {3302}> => <{5802}> 0.5909091 0.8125000 0.9088983   
## 376 <{6002},   
## {6203}> => <{5801}> 0.5909091 0.8125000 0.9088983   
## 377 <{6003},   
## {5803}> => <{5801}> 0.5909091 0.8125000 0.9088983   
## 378 <{6003},   
## {5803}> => <{3302}> 0.5909091 0.8125000 0.9575893   
## 379 <{6003},   
## {3302}> => <{5803}> 0.5757576 0.9047619 1.0663265   
## 380 <{6003},   
## {3302}> => <{5801}> 0.5757576 0.9047619 1.0121065   
## 381 <{3302},   
## {6003}> => <{6201}> 0.5757576 0.8837209 0.9885692   
## 382 <{5801},   
## {6003}> => <{6201}> 0.5757576 0.8837209 0.9885692   
## 383 <{3302},   
## {6003}> => <{3302}> 0.5757576 0.8837209 1.0415282   
## 384 <{3302},   
## {6002}> => <{6203}> 0.5757576 0.8636364 0.9827586   
## 385 <{6001},   
## {3302}> => <{6003}> 0.5757576 0.8636364 1.0754717   
## 386 <{3302},   
## {6002}> => <{5803}> 0.5757576 0.8636364 1.0178571   
## 387 <{6202},   
## {6001}> => <{5803}> 0.5757576 0.8636364 1.0178571   
## 388 <{6003},   
## {6203}> => <{6203}> 0.5757576 0.8444444 0.9609195   
## 389 <{5803},   
## {6002}> => <{6203}> 0.5757576 0.8444444 0.9609195   
## 390 <{6003},   
## {5801}> => <{6201}> 0.5757576 0.8444444 0.9446328   
## 391 <{5803},   
## {3301}> => <{6201}> 0.5757576 0.8444444 0.9446328   
## 392 <{6003},   
## {6203}> => <{5803}> 0.5757576 0.8444444 0.9952381   
## 393 <{6202},   
## {6202}> => <{5803}> 0.5757576 0.8444444 0.9952381   
## 394 <{5803},   
## {3301}> => <{5803}> 0.5757576 0.8444444 0.9952381   
## 395 <{6202},   
## {6202}> => <{5802}> 0.5757576 0.8444444 0.9446328   
## 396 <{6003},   
## {6203}> => <{5801}> 0.5757576 0.8444444 0.9446328   
## 397 <{6202},   
## {3302}> => <{6203}> 0.5757576 0.8260870 0.9400300   
## 398 <{3302},   
## {6202}> => <{5801}> 0.5757576 0.8260870 0.9240973   
## 399 <{3302},   
## {3301}> => <{6203}> 0.5757576 0.8085106 0.9200293   
## 400 <{3301},   
## {5802}> => <{6201}> 0.5757576 0.8085106 0.9044356   
## 401 <{3302},   
## {6201}> => <{6001}> 0.5757576 0.8085106 0.9702128   
## 402 <{6202},   
## {6203}> => <{5802}> 0.5757576 0.8085106 0.9044356   
## 403 <{5803},   
## {6003}> => <{5802}> 0.5757576 0.8085106 0.9044356   
## 404 <{3301},   
## {6001}> => <{5802}> 0.5606061 0.9250000 1.0347458   
## 405 <{6401}> => <{5801}> 0.5606061 0.9250000 1.0347458   
## 406 <{6202},   
## {6003}> => <{5803}> 0.5606061 0.9024390 1.0635889   
## 407 <{3303}> => <{3302}> 0.5606061 0.9024390 1.0635889   
## 408 <{5801},   
## {3301}> => <{5802}> 0.5606061 0.8809524 0.9854722   
## 409 <{3301},   
## {6203}> => <{5803}> 0.5606061 0.8604651 1.0141196   
## 410 <{3301},   
## {6201}> => <{5803}> 0.5606061 0.8604651 1.0141196   
## 411 <{3302},   
## {6003}> => <{5803}> 0.5606061 0.8604651 1.0141196   
## 412 <{3301},   
## {6203}> => <{5802}> 0.5606061 0.8604651 0.9625542   
## 413 <{6001},   
## {3302}> => <{6203}> 0.5606061 0.8409091 0.9568966   
## 414 <{3302},   
## {6002}> => <{6201}> 0.5606061 0.8409091 0.9406780   
## 415 <{6202},   
## {6001}> => <{6201}> 0.5606061 0.8409091 0.9406780   
## 416 <{6002},   
## {5802}> => <{6201}> 0.5606061 0.8409091 0.9406780   
## 417 <{6202},   
## {6001}> => <{6001}> 0.5606061 0.8409091 1.0090909   
## 418 <{3302},   
## {6002}> => <{5801}> 0.5606061 0.8409091 0.9406780   
## 419 <{6002},   
## {5802}> => <{5801}> 0.5606061 0.8409091 0.9406780   
## 420 <{6001},   
## {6202}> => <{6203}> 0.5606061 0.8222222 0.9356322   
## 421 <{3301},   
## {5803}> => <{6203}> 0.5606061 0.8222222 0.9356322   
## 422 <{3301},   
## {5803}> => <{6201}> 0.5606061 0.8222222 0.9197740   
## 423 <{6003},   
## {5801}> => <{5802}> 0.5606061 0.8222222 0.9197740   
## 424 <{5803},   
## {3301}> => <{5801}> 0.5606061 0.8222222 0.9197740   
## 425 <{6003},   
## {6203}> => <{3302}> 0.5606061 0.8222222 0.9690476   
## 426 <{3302},   
## {6202}> => <{6203}> 0.5606061 0.8043478 0.9152924   
## 427 <{6003},   
## {6001}> => <{6201}> 0.5606061 0.8043478 0.8997789   
## 428 <{6202},   
## {3302}> => <{5801}> 0.5606061 0.8043478 0.8997789   
## 429 <{6401}> => <{6203}> 0.5454545 0.9000000 1.0241379   
## 430 <{6203},   
## {3301}> => <{5803}> 0.5454545 0.9000000 1.0607143   
## 431 <{3302},   
## {6001}> => <{6203}> 0.5454545 0.8780488 0.9991590   
## 432 <{3302},   
## {6001}> => <{3302}> 0.5454545 0.8780488 1.0348432   
## 433 <{6003},   
## {3302}> => <{6203}> 0.5454545 0.8571429 0.9753695   
## 434 <{6003},   
## {3302}> => <{6201}> 0.5454545 0.8571429 0.9588378   
## 435 <{6002},   
## {3302}> => <{5803}> 0.5454545 0.8571429 1.0102041   
## 436 <{6003},   
## {3302}> => <{5802}> 0.5454545 0.8571429 0.9588378   
## 437 <{6001},   
## {3301}> => <{5802}> 0.5454545 0.8571429 0.9588378   
## 438 <{6003},   
## {3302}> => <{3302}> 0.5454545 0.8571429 1.0102041   
## 439 <{5801},   
## {3301}> => <{3302}> 0.5454545 0.8571429 1.0102041   
## 440 <{6003},   
## {6202}> => <{6002}> 0.5454545 0.8372093 1.0425625   
## 441 <{3302},   
## {6003}> => <{5802}> 0.5454545 0.8372093 0.9365392   
## 442 <{6202},   
## {6002}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 443 <{6202},   
## {6001}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 444 <{6002},   
## {5802}> => <{6203}> 0.5454545 0.8181818 0.9310345   
## 445 <{6202},   
## {6001}> => <{6202}> 0.5454545 0.8181818 0.9310345   
## 446 <{6001},   
## {6003}> => <{6201}> 0.5454545 0.8181818 0.9152542   
## 447 <{6202},   
## {6002}> => <{5801}> 0.5454545 0.8181818 0.9152542   
## 448 <{6202},   
## {6001}> => <{5801}> 0.5454545 0.8181818 0.9152542   
## 449 <{6001},   
## {3302}> => <{5801}> 0.5454545 0.8181818 0.9152542   
## 450 <{3302},   
## {6002}> => <{3302}> 0.5454545 0.8181818 0.9642857   
## 451 <{6201},   
## {3301}> => <{3302}> 0.5454545 0.8181818 0.9642857   
## 452 <{6203},   
## {6002}> => <{6202}> 0.5454545 0.8000000 0.9103448   
## 453 <{6003},   
## {6002}> => <{6201}> 0.5454545 0.8000000 0.8949153   
## 454 <{6002},   
## {5803}> => <{6003}> 0.5454545 0.8000000 0.9962264   
## 455 <{6003},   
## {6203}> => <{6001}> 0.5454545 0.8000000 0.9600000   
## 456 <{6002},   
## {5803}> => <{6001}> 0.5454545 0.8000000 0.9600000   
## 457 <{6002},   
## {6202}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 458 <{6202},   
## {6202}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 459 <{6003},   
## {6002}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 460 <{3301},   
## {5803}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 461 <{6002},   
## {5803}> => <{5801}> 0.5454545 0.8000000 0.8949153   
## 462 <{3303},   
## {3302}> => <{3302}> 0.5303030 0.9459459 1.1148649   
## 463 <{6003},   
## {3301}> => <{3302}> 0.5303030 0.9210526 1.0855263   
## 464 <{6203},   
## {3301}> => <{6203}> 0.5303030 0.8750000 0.9956897   
## 465 <{6203},   
## {3301}> => <{5802}> 0.5303030 0.8750000 0.9788136   
## 466 <{6203},   
## {3301}> => <{3302}> 0.5303030 0.8750000 1.0312500   
## 467 <{3303}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 468 <{6003},   
## {6003}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 469 <{6202},   
## {6003}> => <{6201}> 0.5303030 0.8536585 0.9549401   
## 470 <{6003},   
## {6003}> => <{5803}> 0.5303030 0.8536585 1.0060976   
## 471 <{6202},   
## {6003}> => <{5802}> 0.5303030 0.8536585 0.9549401   
## 472 <{3303}> => <{3303}> 0.5303030 0.8536585 1.3741820   
## 473 <{6002},   
## {6003}> => <{6201}> 0.5303030 0.8333333 0.9322034   
## 474 <{5801},   
## {3301}> => <{6201}> 0.5303030 0.8333333 0.9322034   
## 475 <{6003},   
## {3302}> => <{6003}> 0.5303030 0.8333333 1.0377358   
## 476 <{6002},   
## {3302}> => <{6001}> 0.5303030 0.8333333 1.0000000   
## 477 <{6003},   
## {3302}> => <{6001}> 0.5303030 0.8333333 1.0000000   
## 478 <{3301},   
## {5801}> => <{5803}> 0.5303030 0.8333333 0.9821429   
## 479 <{5801},   
## {3301}> => <{5803}> 0.5303030 0.8333333 0.9821429   
## 480 <{6001},   
## {3301}> => <{5803}> 0.5303030 0.8333333 0.9821429   
## 481 <{3301},   
## {5801}> => <{3302}> 0.5303030 0.8333333 0.9821429   
## 482 <{6002},   
## {3302}> => <{3302}> 0.5303030 0.8333333 0.9821429   
## 483 <{6001},   
## {3301}> => <{3302}> 0.5303030 0.8333333 0.9821429   
## 484 <{6003},   
## {6202}> => <{6201}> 0.5303030 0.8139535 0.9105242   
## 485 <{3302},   
## {6003}> => <{6003}> 0.5303030 0.8139535 1.0136025   
## 486 <{6003},   
## {6202}> => <{5803}> 0.5303030 0.8139535 0.9593023   
## 487 <{5801},   
## {6003}> => <{5803}> 0.5303030 0.8139535 0.9593023   
## 488 <{6003},   
## {6202}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 489 <{3301},   
## {6201}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 490 <{5801},   
## {6003}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 491 <{6001},   
## {6002}> => <{5802}> 0.5303030 0.8139535 0.9105242   
## 492 <{3303},   
## {3303}> => <{3302}> 0.5151515 0.9714286 1.1448980   
## 493 <{6402}> => <{5803}> 0.5151515 0.8947368 1.0545113   
## 494 <{6003},   
## {3301}> => <{5802}> 0.5151515 0.8947368 1.0008921   
## 495 <{3301},   
## {3301}> => <{3302}> 0.5151515 0.8947368 1.0545113   
## 496 <{6401}> => <{5803}> 0.5151515 0.8500000 1.0017857   
## 497 <{3301},   
## {6202}> => <{3302}> 0.5151515 0.8500000 1.0017857   
## 498 <{6003},   
## {6003}> => <{6001}> 0.5151515 0.8292683 0.9951220   
## 499 <{3302},   
## {6001}> => <{6001}> 0.5151515 0.8292683 0.9951220   
## 500 <{3303}> => <{5801}> 0.5151515 0.8292683 0.9276561   
## 501 <{3302},   
## {6001}> => <{5801}> 0.5151515 0.8292683 0.9276561   
## 502 <{6003},   
## {6003}> => <{3302}> 0.5151515 0.8292683 0.9773519   
## 503 <{6002},   
## {3302}> => <{6203}> 0.5151515 0.8095238 0.9211823   
## 504 <{6001},   
## {3301}> => <{6203}> 0.5151515 0.8095238 0.9211823   
## 505 <{6003},   
## {3302}> => <{6002}> 0.5151515 0.8095238 1.0080863   
## 506 <{6002},   
## {3302}> => <{5802}> 0.5151515 0.8095238 0.9055690   
## 507 <{5801},   
## {3303}> => <{3302}> 0.5000000 0.9705882 1.1439076   
## 508 <{5803},   
## {3303}> => <{3302}> 0.5000000 0.9705882 1.1439076   
## 509 <{3303},   
## {6201}> => <{5803}> 0.5000000 0.9428571 1.1112245   
## 510 <{6201},   
## {3303}> => <{5803}> 0.5000000 0.9428571 1.1112245   
## 511 <{3303},   
## {3303}> => <{3303}> 0.5000000 0.9428571 1.5177700   
## 512 <{6201},   
## {3303}> => <{3302}> 0.5000000 0.9428571 1.1112245   
## 513 <{3302},   
## {3303}> => <{6201}> 0.5000000 0.9166667 1.0254237   
## 514 <{3302},   
## {3303}> => <{3303}> 0.5000000 0.9166667 1.4756098   
## 515 <{3302},   
## {3303}> => <{3302}> 0.5000000 0.9166667 1.0803571   
## 516 <{3303},   
## {3302}> => <{6201}> 0.5000000 0.8918919 0.9977096   
## 517 <{6403}> => <{5801}> 0.5000000 0.8918919 0.9977096   
## 518 <{3303},   
## {3302}> => <{3303}> 0.5000000 0.8918919 1.4357284   
## 519 <{5802},   
## {6401}> => <{5803}> 0.5000000 0.8684211 1.0234962   
## 520 <{3301},   
## {3301}> => <{5802}> 0.5000000 0.8684211 0.9714541   
## 521 <{6402}> => <{5801}> 0.5000000 0.8684211 0.9714541   
## 522 <{3301},   
## {6202}> => <{5803}> 0.5000000 0.8250000 0.9723214   
## 523 <{6401}> => <{5802}> 0.5000000 0.8250000 0.9228814   
## 524 <{3301},   
## {6001}> => <{3302}> 0.5000000 0.8250000 0.9723214   
## 525 <{3303}> => <{6203}> 0.5000000 0.8048780 0.9158957   
## 526 <{6003},   
## {6003}> => <{6203}> 0.5000000 0.8048780 0.9158957   
## 527 <{6202},   
## {6003}> => <{6202}> 0.5000000 0.8048780 0.9158957   
## 528 <{3303}> => <{5803}> 0.5000000 0.8048780 0.9486063   
## 529 <{3303}> => <{5802}> 0.5000000 0.8048780 0.9003721   
## 530 <{6003},   
## {6003}> => <{5801}> 0.5000000 0.8048780 0.9003721   
## 531 <{3302},   
## {6001}> => <{3301}> 0.5000000 0.8048780 0.9837398   
##

#top 10 rules  
inspect(head(sort(seqRules, by=c("confidence", "support")),10))

## lhs rhs support confidence lift   
## 1 <{5803}> => <{6203}> 0.8333333 0.9821429 1.117611   
## 2 <{5803}> => <{5803}> 0.8333333 0.9821429 1.157526   
## 3 <{5803}> => <{5802}> 0.8333333 0.9821429 1.098668   
## 4 <{5803},   
## {6001}> => <{5802}> 0.6969697 0.9787234 1.094843   
## 5 <{3302},   
## {6001}> => <{5802}> 0.6060606 0.9756098 1.091360   
## 6 <{3303},   
## {3303}> => <{3302}> 0.5151515 0.9714286 1.144898   
## 7 <{5801},   
## {3303}> => <{3302}> 0.5000000 0.9705882 1.143908   
## 8 <{5803},   
## {3303}> => <{3302}> 0.5000000 0.9705882 1.143908   
## 9 <{5803}> => <{5801}> 0.8181818 0.9642857 1.078692   
## 10 <{6001}> => <{5802}> 0.8030303 0.9636364 1.077966   
##

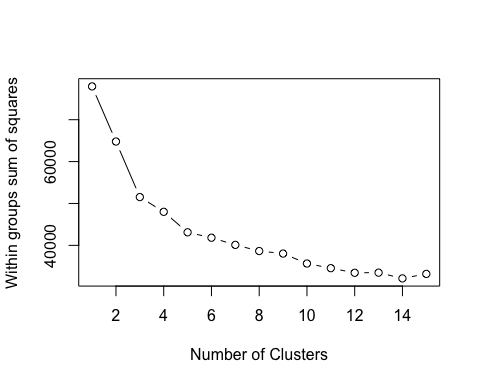
inspect(head(sort(seqRules, by=c("support", "confidence")),10))

## lhs rhs support confidence lift   
## 1 <{5803}> => <{6203}> 0.8333333 0.9821429 1.117611   
## 2 <{5803}> => <{5803}> 0.8333333 0.9821429 1.157526   
## 3 <{5803}> => <{5802}> 0.8333333 0.9821429 1.098668   
## 4 <{6203}> => <{5802}> 0.8333333 0.9482759 1.060783   
## 5 <{6201}> => <{6203}> 0.8333333 0.9322034 1.060783   
## 6 <{5802}> => <{6201}> 0.8333333 0.9322034 1.042804   
## 7 <{6201}> => <{5803}> 0.8333333 0.9322034 1.098668   
## 8 <{5802}> => <{5802}> 0.8333333 0.9322034 1.042804   
## 9 <{5802}> => <{5801}> 0.8333333 0.9322034 1.042804   
## 10 <{6201}> => <{5801}> 0.8333333 0.9322034 1.042804   
##

# Task 2  
# To find the best classifier for a selected dataset.  
# Datasets: • Wine Quality (two sets) - http://archive.ics.uci.edu/ml/datasets/Wine+Quality  
  
# Algorithm used k-means  
  
wine <- read.csv('winequality-white.csv', sep=';')  
wine <- rbind(wine, read.csv('winequality-red.csv', sep=';'))  
summary(wine)

## fixed.acidity volatile.acidity citric.acid residual.sugar   
## Min. : 3.800 Min. :0.0800 Min. :0.0000 Min. : 0.600   
## 1st Qu.: 6.400 1st Qu.:0.2300 1st Qu.:0.2500 1st Qu.: 1.800   
## Median : 7.000 Median :0.2900 Median :0.3100 Median : 3.000   
## Mean : 7.215 Mean :0.3397 Mean :0.3186 Mean : 5.443   
## 3rd Qu.: 7.700 3rd Qu.:0.4000 3rd Qu.:0.3900 3rd Qu.: 8.100   
## Max. :15.900 Max. :1.5800 Max. :1.6600 Max. :65.800   
## chlorides free.sulfur.dioxide total.sulfur.dioxide  
## Min. :0.00900 Min. : 1.00 Min. : 6.0   
## 1st Qu.:0.03800 1st Qu.: 17.00 1st Qu.: 77.0   
## Median :0.04700 Median : 29.00 Median :118.0   
## Mean :0.05603 Mean : 30.53 Mean :115.7   
## 3rd Qu.:0.06500 3rd Qu.: 41.00 3rd Qu.:156.0   
## Max. :0.61100 Max. :289.00 Max. :440.0   
## density pH sulphates alcohol   
## Min. :0.9871 Min. :2.720 Min. :0.2200 Min. : 8.00   
## 1st Qu.:0.9923 1st Qu.:3.110 1st Qu.:0.4300 1st Qu.: 9.50   
## Median :0.9949 Median :3.210 Median :0.5100 Median :10.30   
## Mean :0.9947 Mean :3.219 Mean :0.5313 Mean :10.49   
## 3rd Qu.:0.9970 3rd Qu.:3.320 3rd Qu.:0.6000 3rd Qu.:11.30   
## Max. :1.0390 Max. :4.010 Max. :2.0000 Max. :14.90   
## quality   
## Min. :3.000   
## 1st Qu.:5.000   
## Median :6.000   
## Mean :5.818   
## 3rd Qu.:6.000   
## Max. :9.000

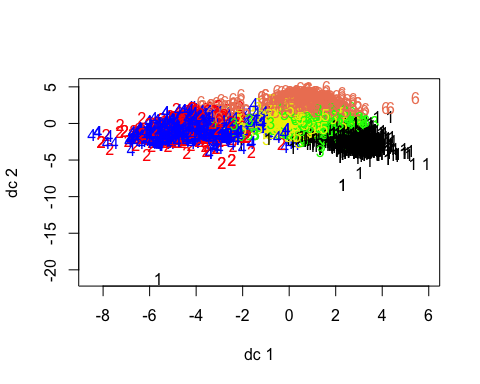
wine<-scale(wine)  
wss<-(nrow(wine)-1)\*sum(apply(wine,2,var))  
for(i in 1:15) wss[i]<-sum(kmeans(wine,centers=i)$withinss)  
plot(1:15,wss,type='b',xlab="Number of Clusters",ylab='Within groups sum of squares')



fit1 <- kmeans(wine,6)  
fit2 <- kmeans(wine,8)  
  
table(fit1$cluster)

##   
## 1 2 3 4 5 6   
## 1489 599 1000 974 1067 1368

library(fpc)  
plotcluster(wine, fit1$cluster)



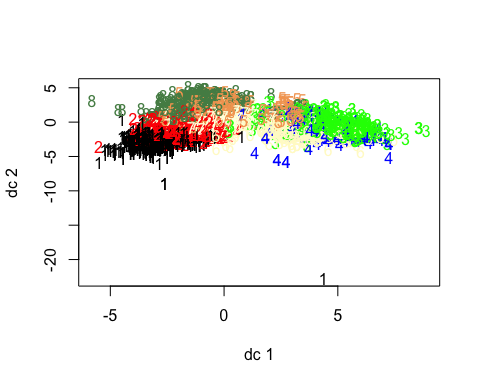
aggregate(wine,by=list(fit1$cluster),FUN=mean)

## Group.1 fixed.acidity volatile.acidity citric.acid residual.sugar  
## 1 1 -0.16752689 -0.3491938 0.31877107 1.4484736  
## 2 2 2.06992783 0.4605692 1.02347399 -0.5692424  
## 3 3 -0.55653215 -0.5405303 -0.12306274 -0.2466654  
## 4 4 0.11632837 1.6909279 -1.23688884 -0.6274381  
## 5 5 0.05253209 -0.3784352 0.16747928 -0.3794943  
## 6 6 -0.44098147 -0.3352153 0.04486918 -0.4043059  
## chlorides free.sulfur.dioxide total.sulfur.dioxide density  
## 1 -0.1409837 0.93892824 0.99898750 0.9113707  
## 2 1.2862784 -0.91194189 -1.30721963 0.9846294  
## 3 -0.2496421 0.44036310 0.58238403 -0.2794716  
## 4 0.6953142 -0.79380080 -1.14520613 0.5153644  
## 5 -0.1924015 -0.44979626 -0.03184378 -0.4462262  
## 6 -0.5722644 -0.02856685 -0.10047061 -1.2377149  
## pH sulphates alcohol quality  
## 1 -0.50719132 -0.27620133 -0.87286243 -0.2426901  
## 2 -0.07166335 1.46228433 0.08255198 0.1085718  
## 3 0.72026350 0.01029343 -0.15481877 0.1129364  
## 4 0.93942432 0.41310866 -0.25427996 -0.5280108  
## 5 -0.65679902 -0.47767494 -0.14766202 -0.5905029  
## 6 -0.09965206 -0.26873293 1.32330873 0.9705730

mydata <- data.frame(wine, fit1$cluster)  
  
  
table(fit2$cluster)

##   
## 1 2 3 4 5 6 7 8   
## 1036 884 595 473 881 520 1014 1094

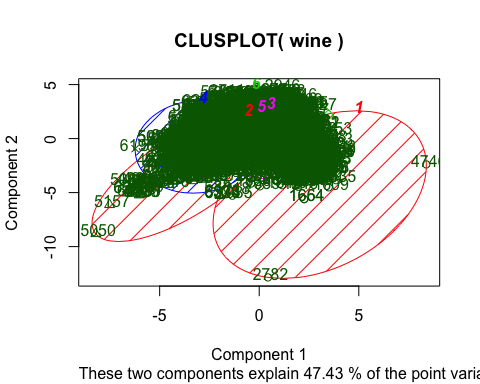
library(fpc)  
plotcluster(wine, fit2$cluster)



aggregate(wine,by=list(fit2$cluster),FUN=mean)

## Group.1 fixed.acidity volatile.acidity citric.acid residual.sugar  
## 1 1 -0.080602849 -0.3745761 0.39346570 1.7947264  
## 2 2 -0.410656163 -0.3808593 0.01680072 0.3027486  
## 3 3 -0.209505178 1.8640889 -1.66620266 -0.6418204  
## 4 4 2.279402714 0.3575432 1.16077810 -0.5674000  
## 5 5 -0.647402052 -0.5616939 -0.02207273 -0.4996726  
## 6 6 0.781048430 1.2915247 -0.28001311 -0.5621462  
## 7 7 -0.009677103 -0.3834958 0.09179306 -0.3964815  
## 8 8 -0.304340673 -0.3120531 0.08394422 -0.3127450  
## chlorides free.sulfur.dioxide total.sulfur.dioxide density  
## 1 -0.17765848 0.741325255 0.88681010 1.1466453  
## 2 -0.05253308 1.162337289 1.11427880 0.1338623  
## 3 0.59409242 -0.857604101 -1.33203542 0.3533232  
## 4 1.37288816 -0.986303318 -1.40551384 0.9934924  
## 5 -0.40703042 0.055137266 0.05918235 -0.6958865  
## 6 0.91052102 -0.660820404 -0.78846897 0.8277767  
## 7 -0.24280257 -0.521765226 -0.04112491 -0.4378093  
## 8 -0.58596252 0.004933638 -0.04280049 -1.2429957  
## pH sulphates alcohol quality  
## 1 -0.60601260 -0.2081820 -0.93725806 -0.1413069  
## 2 -0.06321238 -0.2964106 -0.56698237 -0.3568148  
## 3 1.30201838 0.4510459 -0.01236008 -0.4252123  
## 4 -0.16976334 1.6391250 0.20995181 0.2564034  
## 5 0.96270639 0.2854556 0.46547064 0.6460220  
## 6 0.31108436 0.4271246 -0.62731929 -0.6839053  
## 7 -0.54367532 -0.4797961 -0.19290902 -0.6288504  
## 8 -0.42899040 -0.5055327 1.36379793 0.9302380

mydata <- data.frame(wine, fit2$cluster)  
  
library(cluster)  
clusplot(wine, fit1$cluster, color=TRUE, shade=TRUE,labels=2, lines=0)



cluster.stats(fit1$cluster, fit2$cluster)

## Warning in as.dist.default(d): non-square matrix

## Warning in as.matrix.dist(d): number of items to replace is not a multiple  
## of replacement length

## $n  
## [1] 6497  
##   
## $cluster.number  
## [1] 8  
##   
## $cluster.size  
## [1] 1036 884 595 473 881 520 1014 1094  
##   
## $min.cluster.size  
## [1] 473  
##   
## $noisen  
## [1] 0  
##   
## $diameter  
## [1] 6 6 6 6 6 6 6 6  
##   
## $average.distance  
## [1] 3.550318 3.560092 3.558000 3.558435 3.555608 3.565170 3.556194 3.561001  
##   
## $median.distance  
## [1] 4 4 4 4 4 4 4 4  
##   
## $separation  
## [1] 1 1 1 1 1 1 1 1  
##   
## $average.toother  
## [1] 3.557945 3.558311 3.560023 3.560843 3.560761 3.562215 3.562131 3.560994  
##   
## $separation.matrix  
## [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]  
## [1,] 0 1 1 1 1 1 1 1  
## [2,] 1 0 1 1 1 1 1 1  
## [3,] 1 1 0 1 1 1 1 1  
## [4,] 1 1 1 0 1 1 1 1  
## [5,] 1 1 1 1 0 1 1 1  
## [6,] 1 1 1 1 1 0 1 1  
## [7,] 1 1 1 1 1 1 0 1  
## [8,] 1 1 1 1 1 1 1 0  
##   
## $ave.between.matrix  
## [,1] [,2] [,3] [,4] [,5] [,6] [,7]  
## [1,] 0.000000 3.554607 3.552490 3.557209 3.558931 3.557858 3.555375  
## [2,] 3.554607 0.000000 3.556614 3.557030 3.560380 3.560296 3.556190  
## [3,] 3.552490 3.556614 0.000000 3.557024 3.561364 3.557498 3.573318  
## [4,] 3.557209 3.557030 3.557024 0.000000 3.560182 3.563258 3.569544  
## [5,] 3.558931 3.560380 3.561364 3.560182 0.000000 3.566087 3.561178  
## [6,] 3.557858 3.560296 3.557498 3.563258 3.566087 0.000000 3.573363  
## [7,] 3.555375 3.556190 3.573318 3.569544 3.561178 3.573363 0.000000  
## [8,] 3.565558 3.562650 3.559006 3.560764 3.559808 3.556553 3.559469  
## [,8]  
## [1,] 3.565558  
## [2,] 3.562650  
## [3,] 3.559006  
## [4,] 3.560764  
## [5,] 3.559808  
## [6,] 3.556553  
## [7,] 3.559469  
## [8,] 0.000000  
##   
## $average.between  
## [1] 3.560297  
##   
## $average.within  
## [1] 3.557176  
##   
## $n.between  
## [1] 18253455  
##   
## $n.within  
## [1] 2848801  
##   
## $max.diameter  
## [1] 6  
##   
## $min.separation  
## [1] 1  
##   
## $within.cluster.ss  
## [1] 52081.68  
##   
## $clus.avg.silwidths  
## 1 2 3 4 5 6   
## -0.04989586 -0.05334544 -0.03016389 -0.03446179 -0.04993161 -0.03754506   
## 7 8   
## -0.05081730 -0.04921914   
##   
## $avg.silwidth  
## [1] -0.0464807  
##   
## $g2  
## NULL  
##   
## $g3  
## NULL  
##   
## $pearsongamma  
## [1] 0.0005786358  
##   
## $dunn  
## [1] 0.1666667  
##   
## $dunn2  
## [1] 0.9964435  
##   
## $entropy  
## [1] 2.036751  
##   
## $wb.ratio  
## [1] 0.9991234  
##   
## $ch  
## [1] -926.714  
##   
## $cwidegap  
## [1] 1 1 1 1 1 1 1 1  
##   
## $widestgap  
## [1] 1  
##   
## $sindex  
## [1] 1  
##   
## $corrected.rand  
## NULL  
##   
## $vi  
## NULL