

**CS 5593 - Fall 2019 - Dr. Le Gruenwald**  
**HOMEWORK 3**

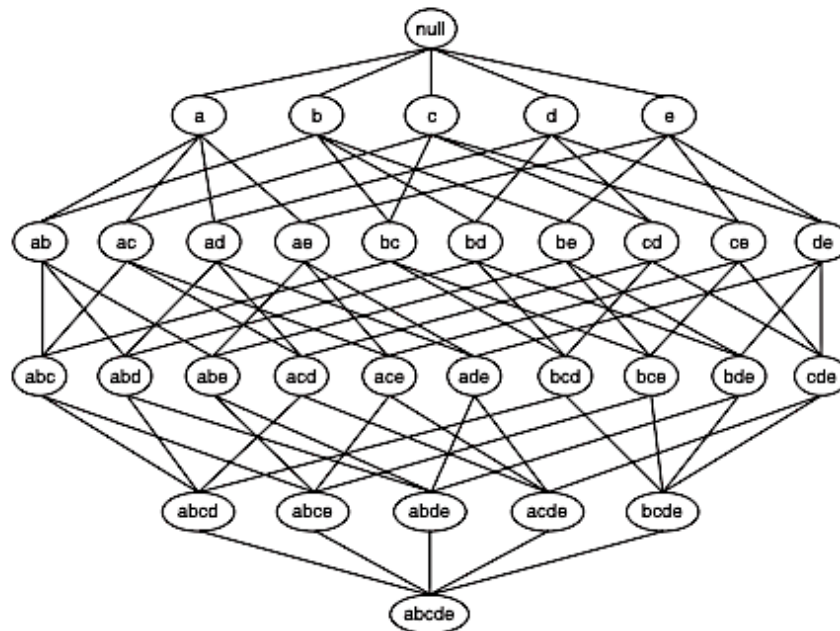
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Problem 1 (20 points): Do exercise 12 in Chapter 5 in the textbook using the following market basket transactions and a minimum support threshold of 30%. You must show and explain your work step by step.

Transaction ID	Items Bought
1	{a,c,e}
2	{b,e}
3	{b,c,d,e}
4	{c,d}
5	{a,b,c,e}
6	{b,d}
7	{b,c,d,e}
8	{b,c,e}
9	{a,b,c,d,e}
10	{a,c,d}
11	{c,d,e}
12	{a,e}

- **M** if the node is a maximal frequent itemset,
- **C** if it is a closed frequent itemset, (**I marked it as CF**)
- **N** if it is frequent but neither maximal nor closed, and
- **I** if it is infrequent

Given the lattice structure shown in Figure 6.4 and the transactions given in Above Table, label each node with the following letter(s):



**Figure 6.4. An itemset lattice**

Let's first find which are frequent and which are infrequent from the dataset that we got. Given the minimum support threshold 30% which means from total 12 transactions 30% is equal to 3.6 is the support count.

a	5
b	7
c	9
d	7
e	9

None of them are less than 3.6 count

{a,b}	2
{a,c}	4
{a,d}	2
{a,e}	4
{b,c}	5
{b,d}	4
{b,e}	6
{c,d}	6
{c,e}	7
{d,e}	4

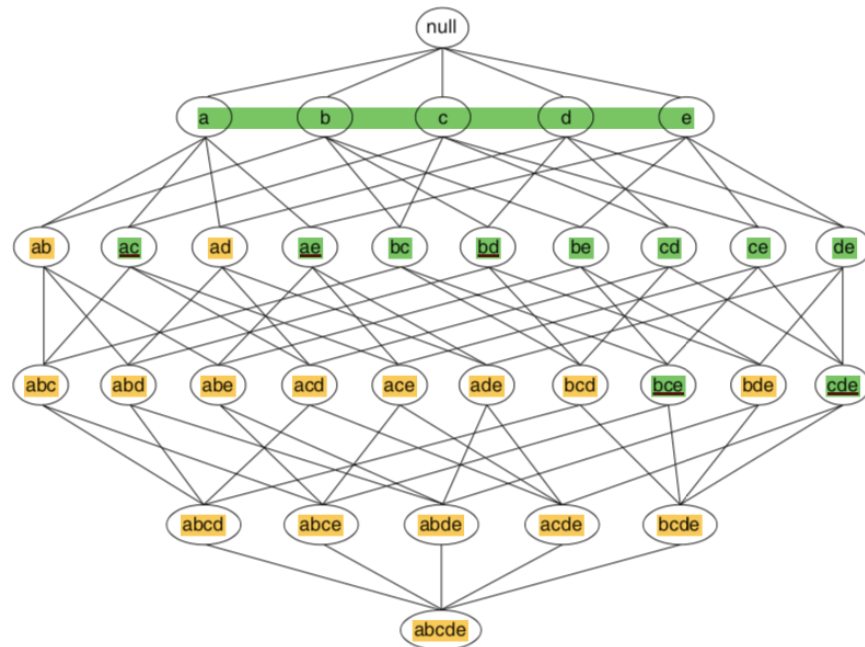
{a,b} and {a,d} are less than 3.6 count

{a,c,e}	3
{b,c,d}	3
{b,c,e}	5
{b,d,e}	3
{c,d,e}	4

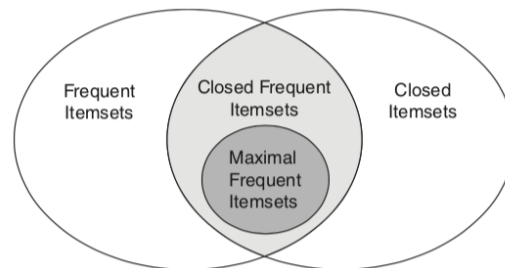
{a,c,e}, {b,c,d}, and {b,d,e} are less than 3.6 support count which can be treated as infrequent. All the supersets also became infrequent.

Since it is less than 3.6 it is infrequent. Down below updated itemset lattice has yellow color with infrequent and green with frequent item sets.

**(Maximal Frequent Itemset).** A frequent itemset is maximal if none of its immediate supersets are frequent. From the above lattice we can say {a,c}, {a,e}, {b,d}, {b,c,e}, {c,d,e}, are Maximal Frequent Itemsets. As showed in the Below lattice itemsets with underlined.



A **closed itemset** is an itemset whose all immediate supersets have different support count. A closed frequent itemset is a closed itemset that satisfies the minimum support threshold (Means which are frequent). And Every closed frequent itemsets are maximal frequent itemsets. But not all MFI's are CFI's, As explained from below diagram.



Relationships among frequent, closed, closed frequent, and maximal frequent itemsets.

For checking each frequent itemset if it is closed frequent itemset or not by checking the which has different support count.

For sc{a} = 1,5,9,10,12		For sc{b} = 2,3,5,6,7,8,9		For sc{c} = 1,3,4,5,7,8,9,10,11		For sc{d} = 3,4,6,7,9,10,11		For sc{e} = 1,2,3,5,7,8,9,11, 12
ab	5,9	ab	5,9	ac	1,5,9,10	ad	9,10	As there in the left <b>ae,be,ce,de</b>
ac	1,5,9,10	bc	3,5,7,8,9	bc	3,5,7,8,9	bd	3,6,7,9	
ad	9,10	bd	3,6,7,9	cd	3,4,7,9,10,11	cd	3,4,7,9,10,11	
ae	1,5,9,12	be	2,4,5,7,8,9	ce	1,3,5,7,8,9,11	de	3,7,9,11	

From this we can tell all has different support count. All these can be treated as closed frequent itemsets. Let's see next level

{a,c}	4 = {1,5,9,10}
{a,e}	4 = {1,5,9,12}
{b,c}	5 = {3,5,7,8,9}
{b,d}	4 = {3,6,7,9}
{b,e}	6 = {2,4,5,7,8,9}
{c,d}	6 = {3,4,7,9,10,11}
{c,e}	7 = {1,3,5,7,8,9,11}
{d,e}	4 = {3,7,9,11}

{a,b,c}	2 = {5,9}
{a,b,d}	1 = {9}
{a,b,e}	2 = {5,9}
{a,c,d}	2 = {9,10}
{a,c,e}	3 = {1,5,9}
{a,d,e}	1 = {9}
{b,c,d}	3 = {3,7,9}
{b,c,e}	5 = {3,5,7,8,9}
{b,d,e}	3 = {3,7,9}
{c,d,e}	4 = {3,7,9,11}

From checking we can conclude {b,c} and {d,e} are not closed frequent itemsets. Now let's see for next level.

{b,c,e}	5 = {3,5,7,8,9}
{c,d,e}	4 = {3,7,9,11}

{a,b,c,e}	2 = {5,9}
{b,c,d,e}	3 = {3,7,9}
{a,c,d,e}	1 = {9}

From checking we can conclude both are closed frequent itemsets. Finally we got a,b,c,d,e,ac,ae,bd,be,cd,ce,bce,cde are closed frequent itemsets.

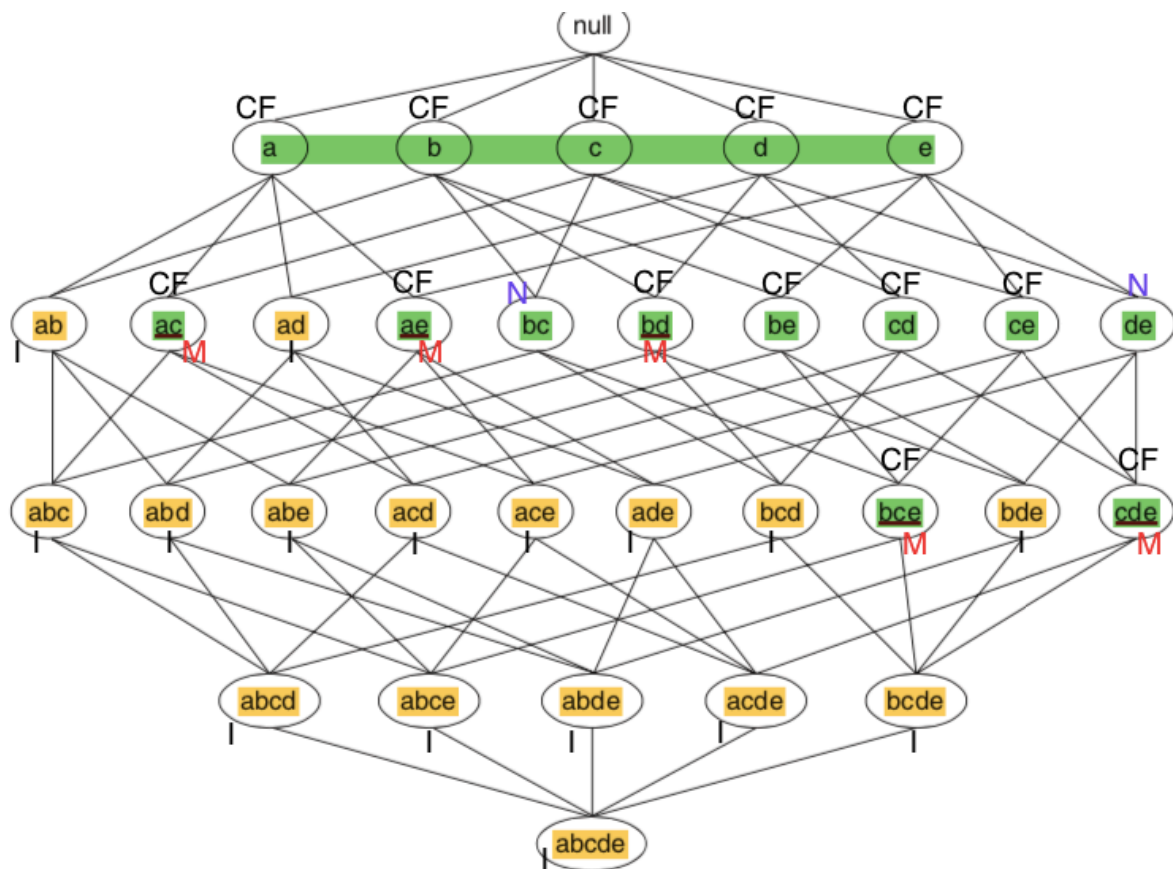
We got {b,c} and {d,e} which are not maximum and closed frequent itemsets. Likewise updated in the itemset lattice down below.

### Closed frequent set – CF

**Maximum frequent set - M**

**N – non of CF and M**

**I – in frequent.**



Problem 2 (80 points): Using a programming language of your choice (e.g. R, Python, Java, or C), perform the following tasks concerning the generation of frequent itemsets and association rules:

2.1. Download the dataset file HW3\_data.csv from the class website.

2.2. Download Chapter 6 “Frequent Itemsets” of the second edition of the book Mining of Massive Datasets by Jure Leskovec, Anand Rajaraman, and Jeff Ullman from the class website, and read the Simple Random Algorithm for frequent itemset generation in Section 6.4.1.

2.3. Write a function to implement the Apriori algorithm described on page 368 of the class' textbook for frequent itemset generation.

### Apriori algorithm

```
def createC1(dataSet): # 1st candidate set
    C1 = []
    for transaction in dataSet:
        for item in transaction:
            if not [item] in C1:
                C1.append([item])

    C1.sort()
    return list(map(frozenset, C1))#use frozen set so we can use it as a key
                                   #in a dict

def support_data(D, Ck, minSup):
    ssCnt = {}
    for tid in D: # from the whole transactions
        for can in Ck: # from the previous frequent item sets
            if can.issubset(tid): # pruning and getting only frequent
                if not can in ssCnt: ssCnt[can]=1
                else: ssCnt[can] += 1
    retList = []
    supportData = {}
    for key in ssCnt:
        # calculating support count from the candidate item sets
        support = ssCnt[key]/float(len(D)) # support count calculation
        if support >= minSup: # checking
            retList.insert(0, key)
            supportData[key] = support # frequent item sets
    return retList, supportData

def Candidate_Gen(Lk, k): #creates Ck
    retList = []
    lenLk = len(Lk)
    for i in range(lenLk):
        for j in range(i+1, lenLk):
            L1 = list(Lk[i])[:k-2]; L2 = list(Lk[j])[:k-2]
            L1.sort(); L2.sort()
            if L1==L2: #if first k-2 elements are equal
                retList.append(Lk[i] | Lk[j]) #set union

    return retList

def myapriori(dataSet, minSup = 0.1):
```

```

k = 1
C1 = createC1(dataSet) # getting level 1 candidates, all unique items
D = list(map(set, dataSet)) # get all transactions on dataset
L1, supportData = support_data(D, C1, minSup)
#{ i | i ∈ I ∧ σ({i}) ≥ N × minsup}. and return support data for all
given level data
Fk = [L1] # adding to fullfreqset

while (len(Fk[k-1]) > 0):
    k = k+1
    Ck = Candidate_Gen(Fk[k-2], k)
    # Generate candidate itemsets. by passing previous level frequent set.
    #No need of prune here
    Lk, supK = support_data(D, Ck, minSup)
    # { c | c ∈ Ck ∧ σ(c) ≥ N × minsup} {Extract the frequent k-itemsets.}
    supportData.update(supK)
    # update final result (all items and its support count)
    Fk.append(Lk)
    # update final result (all frequentitem )

return Fk, supportData

```

2.4. Write a function to implement the Simple Randomized algorithm described in Section 6.4.1 of Ullman's book to generate frequent itemsets (see the reference list at the end of this homework assignment). On the samples that the Simple Randomized algorithm draws you must use the Apriori algorithm to find their frequent itemsets.

```

def sampling(data, sampleSize = 0.2): # 10% 20% 30%
    from random import sample

    return sample(data, int(sampleSize*(len(data))))

```

2.5. Write a function to implement an algorithm to generate the association rules from the discovered frequent itemsets.

```

def Candidate_Gen(Lk, k): #creates Ck
    retList = []
    lenLk = len(Lk)
    for i in range(lenLk):
        for j in range(i+1, lenLk):
            L1 = list(Lk[i])[:k-2]; L2 = list(Lk[j])[:k-2]
            L1.sort(); L2.sort()
            if L1==L2: #if first k-2 elements are equal
                retList.append(Lk[i] | Lk[j]) #set union
    return retList

def calcConf(freqSet, H, supportData, brl, minConf=0.7):
    prunedH = [] #create new list to return
    for conseq in H:
        conf = supportData[freqSet]/supportData[freqSet-conseq] #calc
        confidence
        if conf >= minConf:
            brl.append((freqSet-conseq, conseq, conf, supportData[freqSet],
            supportData[conseq]))
            prunedH.append(conseq)

```

```

        if(len(freqSet-conseq) != len(conseq)):
            conf = supportData[freqSet-conseq]/supportData[conseq] #calc
confidence
            brl.append((conseq, freqSet-conseq, conf,
supportData[freqSet], supportData[freqSet-conseq]))

        return pruned

def rulesFromConseq(freqSet, H, supportData, brl, minConf=0.7):
    m = len(H[0])
    if (len(freqSet) > (m + 1)): #try further merging
        Hmp1 = Candidate_Gen(H, m+1)#create Hm+1 new candidates
        Hmp1 = calcConf(freqSet, Hmp1, supportData, brl, minConf)
        if (len(Hmp1) > 1):    #need at least two sets to merge

            rulesFromConseq(freqSet, Hmp1, supportData, brl, minConf)

def generateRules(L, supportData, minConf=0.7): #supportData is a dict
coming from scanD
    bigRuleList = []
    for i in range(1, len(L)):#only get the sets with two or more items
        for freqSet in L[i]:
            H = [frozenset([item]) for item in freqSet]
            if (i > 1):
                rulesFromConseq(freqSet, H, supportData, bigRuleList,
minConf)
            else:
                calcConf(freqSet, H, supportData, bigRuleList, minConf)
    return bigRuleList

```

2.6. Run a program that calls the functions implemented for Tasks 2.3, 2.4, and 2.5 on the given dataset to generate the frequent itemsets and association rules. Use the minimum support thresholds of 1%, 2%, and 5% and the minimum confidence threshold of 5%. For the Simple Randomized algorithm, choose the samples of sizes  $p=10\%$ ,  $20\%$ , and  $30\%$ . Measure the total execution time of the generation of frequent itemsets for each of the two algorithms, Apriori and Simple Randomized, and count the number of frequent itemsets generated by each of these two algorithms.

```

import pandas as pd
import numpy as np
from datetime import datetime
import itertools
data = pd.read_csv('HW3_data.csv')
# cleaning data and converting to list of lists
lol = data.values.tolist()
newlol = [[]]*len(lol)
for index,l in enumerate(lol):

```



```
newlol[index] = [str(int(x)) for x in l if ~np.isnan(x)]
```

```
MinSups = [0.01, 0.03, 0.05]
```

```
for ms in MinSups:
```

```
    print("-----FOR FULL DATA MIN SUPPORT FREQUENCY:-----",ms)
```

```
    start = datetime.now()
```

```
    L,suppData = myapriori(newlol,ms) # 0.1, 0.3, 0.5
```

```
    for i in L:
```

```
        print([list(x) for x in i], 'length:', len(i))
```

```
    print('Execution Time :',datetime.now()-start)
```

```
    print('No of Candidate sets:', len(suppData))
```

```
    print('No of frequent sets:', len(list(itertools.chain.from_iterable(L))))
```

```
    rules= generateRules(L,suppData, minConf=0.05)
```

```
    for n,i in enumerate(rules):
```

```
        print('Rule',n+1,',',list(i[0]),'==>',list(i[1]),'conf:',i[2], 'support:',i[3], 'lift:', i[2]/i[4])
```

```
-----FOR FULL DATA MIN SUPPORT FREQUENCY:----- 0.01
```

```
[[['16218'], ['16011'], ['15833'], ['14099'], ['13042'], ['12926'], ['10516'], ['3271'], ['2959'], ['2239'], ['1394'], ['1328'], ['1147'], ['1005'], ['957'], ['825'], ['784'], ['10'], ['741'], ['20'], ['678'], ['605'], ['593'], ['590'], ['549'], ['534'], ['523'], ['480'], ['476'], ['439'], ['414'], ['339'], ['311'], ['302'], ['287'], ['272'], ['271'], ['265'], ['259'], ['256'], ['250'], ['243'], ['238'], ['226'], ['202'], ['186'], ['180'], ['176'], ['171'], ['162'], ['148'], ['124'], ['118'], ['111'], ['90'], ['102'], ['80'], ['79'], ['66'], ['61'], ['50'], ['49'], ['46'], ['42'], ['40'], ['39'], ['38'], ['37'], ['33'], ['32']] length: 70
```

```
[[['40', '12926'], ['40', '2239'], ['2239', '49'], ['40', '414'], ['40', '1328'], ['49', '1328'], ['49', '272'], ['40', '1147'], ['40', '534'], ['49', '111'], ['49', '311'], ['49', '226'], ['271', '49'], ['476', '40'], ['476', '49'], ['40', '439'], ['49', '439'], ['49', '414'], ['42', '66'], ['61', '40'], ['40', '311'], ['287', '39'], ['238', '49'], ['271', '40'], ['40', '272'], ['40', '226'], ['40', '256'], ['49', '256'], ['49', '66'], ['238', '40'], ['40', '66'], ['33', '39'], ['40', '33'], ['49', '33'], ['171', '39'], ['171', '40'], ['171', '49'], ['40', '148'], ['49', '148'], ['111', '39'], ['40', '111'], ['40', '102'], ['49', '102'], ['40', '90'], ['49', '90'], ['49', '37'], ['49', '42'], ['80', '49'], ['80', '40'], ['42', '33'], ['49', '39'], ['40', '49'], ['37', '39'], ['38', '39'], ['40', '37'], ['40', '39'], ['42', '39'], ['40', '42']] length: 58
```

```
[[['40', '49', '311'], ['40', '49', '111'], ['49', '111', '39'], ['40', '49', '226'], ['476', '49', '40'], ['238', '49', '40'], ['40', '49', '66'], ['49', '33', '39'], ['40', '33', '39'], ['49', '42', '33'], ['40', '42', '33'], ['40', '49', '33'], ['171', '49', '40'], ['171', '49', '39'], ['171', '40', '39'], ['40', '111', '39'], ['40', '49', '90'], ['40', '49', '102'], ['40', '49', '42'], ['40', '49', '37'], ['49', '42', '39'], ['49', '39', '37'], ['40', '49', '39'], ['40', '42', '39'], ['40', '39', '37']] length: 25
```

```
[[['49', '40', '111', '39'], ['49', '33', '40', '39'], ['49', '33', '42', '40'], ['49', '40', '171', '39'], ['49', '40', '39', '37'], ['49', '42', '40', '39']] length: 6
```

```
[] length: 0
```

```
Execution Time : 0:05:17.161543
```

```
No of Candidate sets: 19273
```

```
No of frequent sets: 159
```

```
Rule 1 ] ['12926'] ==> ['40'] conf: 0.6394001363326517 support: 0.010639625231111262 lift: 1.1123858987513153
```

```
Rule 2 ] ['2239'] ==> ['40'] conf: 0.7504373177842565 support: 0.01459829176166332 lift: 1.3055610137775595
```

```
Rule 3 ] ['2239'] ==> ['49'] conf: 0.5568513119533527 support: 0.010832454259820101 lift: 1.1651256322088412
```

Rule 4 ] ['414'] ==> ['40'] conf: 0.601063829787234 support: 0.012817458967116979 lift: 1.0456909382905246  
 Rule 5 ] ['1328'] ==> ['40'] conf: 0.6472564389697648 support: 0.013112373952201087 lift: 1.1260537723929636  
 Rule 6 ] ['1328'] ==> ['49'] conf: 0.541993281075028 support: 0.010979911752362155 lift: 1.1340374902778105  
 Rule 7 ] ['272'] ==> ['49'] conf: 0.5205348615090736 support: 0.012363743605449121 lift: 1.0891390512756958  
 Rule 8 ] ['1147'] ==> ['40'] conf: 0.6893408134642357 support: 0.011150055012987603 lift: 1.199269372586492  
 Rule 9 ] ['534'] ==> ['40'] conf: 0.6200403496973773 support: 0.01045813908644412 lift: 1.0787050275218644  
 Rule 10 ] ['111'] ==> ['49'] conf: 0.49391553328561205 support: 0.01565317997754109 lift: 1.0334422055296748  
 Rule 11 ] ['311'] ==> ['49'] conf: 0.6522744795682344 support: 0.01919215979855038 lift: 1.3647839181966326  
 Rule 12 ] ['226'] ==> ['49'] conf: 0.5330058335891925 support: 0.01969124669638502 lift: 1.115232640205454  
 Rule 13 ] ['271'] ==> ['49'] conf: 0.5519031141868511 support: 0.010855140027903495 lift: 1.1547722902533994  
 Rule 14 ] ['476'] ==> ['40'] conf: 0.6922011998154131 support: 0.017014326062544664 lift: 1.2042456828204564  
 Rule 15 ] ['476'] ==> ['49'] conf: 0.6589755422242731 support: 0.01619763841154252 lift: 1.3788048600459035  
 Rule 16 ] ['439'] ==> ['40'] conf: 0.6763285024154589 support: 0.014292033892537517 lift: 1.1766314178875041  
 Rule 17 ] ['439'] ==> ['49'] conf: 0.5501878690284487 support: 0.011626456142738852 lift: 1.151183403854683  
 Rule 18 ] ['414'] ==> ['49'] conf: 0.6037234042553191 support: 0.01287417338732546 lift: 1.2631982684835217  
 Rule 19 ] ['66'] ==> ['42'] conf: 0.22249552772808587 support: 0.011286169621487959 lift: 1.312507743060273  
 Rule 20 ] ['42'] ==> ['66'] conf: 0.0665774506523921 support: 0.011286169621487959 lift: 1.3125077430602727  
 Rule 21 ] ['61'] ==> ['40'] conf: 0.6601746138347885 support: 0.011150055012987603 lift: 1.1485279552104348  
 Rule 22 ] ['311'] ==> ['40'] conf: 0.7139552814186584 support: 0.02100702124522181 lift: 1.2420919894454927  
 Rule 23 ] ['39'] ==> ['287'] conf: 0.07155680943831752 support: 0.01265865859053323 lift: 5.332645711658082  
 Rule 24 ] ['287'] ==> ['39'] conf: 0.9433643279797127 support: 0.01265865859053323 lift: 5.332645711658082  
 Rule 25 ] ['238'] ==> ['49'] conf: 0.5547493403693932 support: 0.019078730958133415 lift: 1.1607275803086763  
 Rule 26 ] ['271'] ==> ['40'] conf: 0.6885813148788926 support: 0.013543403545785551 lift: 1.197948047381116  
 Rule 27 ] ['272'] ==> ['40'] conf: 0.6848137535816619 support: 0.016265695715792696 lift: 1.1913934944156466  
 Rule 28 ] ['226'] ==> ['40'] conf: 0.7218299048203869 support: 0.026667120382028335 lift: 1.255791736336855  
 Rule 29 ] ['256'] ==> ['40'] conf: 0.7170963364993216 support: 0.01198942843207314 lift: 1.2475565884976159  
 Rule 30 ] ['256'] ==> ['49'] conf: 0.7170963364993216 support: 0.01198942843207314 lift: 1.5004136732435431  
 Rule 31 ] ['66'] ==> ['49'] conf: 0.5655187835420393 support: 0.0286861537414503 lift: 1.1832609819829056  
 Rule 32 ] ['49'] ==> ['66'] conf: 0.06002135991456034 support: 0.0286861537414503 lift: 1.1832609819829056  
 Rule 33 ] ['238'] ==> ['40'] conf: 0.6362137203166227 support: 0.021880423316432435 lift: 1.1068423837559698  
 Rule 34 ] ['66'] ==> ['40'] conf: 0.623211091234347 support: 0.03161261782420798 lift: 1.0842212730993837  
 Rule 35 ] ['40'] ==> ['66'] conf: 0.054997533300444004 support: 0.03161261782420798 lift: 1.0842212730993837  
 Rule 36 ] ['39'] ==> ['33'] conf: 0.18164914080533473 support: 0.03213439049012602 lift: 1.0558693151275211  
 Rule 37 ] ['33'] ==> ['39'] conf: 0.1867871035801411 support: 0.03213439049012602 lift: 1.0558693151275211  
 Rule 38 ] ['33'] ==> ['40'] conf: 0.5574602755983384 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 39 ] ['40'] ==> ['33'] conf: 0.16684755796743955 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 40 ] ['33'] ==> ['49'] conf: 0.5297026438979363 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 41 ] ['49'] ==> ['33'] conf: 0.19067283730865078 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 42 ] ['39'] ==> ['171'] conf: 0.1943447037701975 support: 0.03438028153038192 lift: 5.5287587702756955  
 Rule 43 ] ['171'] ==> ['39'] conf: 0.9780574378831881 support: 0.03438028153038192 lift: 5.5287587702756955  
 Rule 44 ] ['171'] ==> ['40'] conf: 0.664407873507583 support: 0.023354998241852973 lift: 1.1558926992856837  
 Rule 45 ] ['171'] ==> ['49'] conf: 0.5024201355275895 support: 0.01766087045292136 lift: 1.0512367762726431  
 Rule 46 ] ['148'] ==> ['40'] conf: 0.6391231028667791 support: 0.012896859155408854 lift: 1.1119039343233963  
 Rule 47 ] ['148'] ==> ['49'] conf: 0.5823496346261945 support: 0.011751227867197513 lift: 1.2184769464407246

Rule 48 ] ['39'] ==> ['111'] conf: 0.17472428827904593 support: 0.030909359013622805 lift: 5.513195411227262  
 Rule 49 ] ['111'] ==> ['39'] conf: 0.9753042233357194 support: 0.030909359013622805 lift: 5.513195411227261  
 Rule 50 ] ['111'] ==> ['40'] conf: 0.629563350035791 support: 0.01995213302934404 lift: 1.095272511149588  
 Rule 51 ] ['102'] ==> ['40'] conf: 0.6258381761287438 support: 0.015880037658375017 lift: 1.0887917009508867  
 Rule 52 ] ['102'] ==> ['49'] conf: 0.5860527492177022 support: 0.014870520978664035 lift: 1.2262251435571816  
 Rule 53 ] ['90'] ==> ['40'] conf: 0.7164451394318478 support: 0.03118158823062352 lift: 1.2464236790814234  
 Rule 54 ] ['40'] ==> ['90'] conf: 0.054247656635421804 support: 0.03118158823062352 lift: 1.2464236790814236  
 Rule 55 ] ['90'] ==> ['49'] conf: 0.729215532968465 support: 0.031737389548666645 lift: 1.5257712258700094  
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 Rule 57 ] ['37'] ==> ['49'] conf: 0.48228882833787473 support: 0.01606152380304216 lift: 1.0091151155831346  
 Rule 58 ] ['42'] ==> ['49'] conf: 0.6034125125460019 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 59 ] ['49'] ==> ['42'] conf: 0.2140263438946244 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 60 ] ['80'] ==> ['49'] conf: 0.558125 support: 0.010129195449234922 lift: 1.1677906283374866  
 Rule 61 ] ['80'] ==> ['40'] conf: 0.694375 support: 0.012601944170324746 lift: 1.208027516033547  
 Rule 62 ] ['33'] ==> ['42'] conf: 0.2107206435023406 support: 0.036251857397261826 lift: 1.2430473504054766  
 Rule 63 ] ['42'] ==> ['33'] conf: 0.21385078621612577 support: 0.036251857397261826 lift: 1.2430473504054766  
 Rule 64 ] ['39'] ==> ['49'] conf: 0.5093613747114645 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 65 ] ['49'] ==> ['39'] conf: 0.1885368458526166 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 66 ] ['49'] ==> ['40'] conf: 0.6916340334638661 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 67 ] ['40'] ==> ['49'] conf: 0.5750764676862358 support: 0.3305543267431177 lift: 1.2032589644638954  
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 Rule 69 ] ['37'] ==> ['39'] conf: 0.9502724795640327 support: 0.03164664647633307 lift: 5.371696080459393  
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 Rule 71 ] ['38'] ==> ['39'] conf: 0.9739292364990689 support: 0.011864656707614479 lift: 5.505422891702643  
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 Rule 73 ] ['39'] ==> ['40'] conf: 0.6633111054116441 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 74 ] ['40'] ==> ['39'] conf: 0.20414405525407003 support: 0.11734213541134969 lift: 1.1539846149816664  
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 Rule 77 ] ['42'] ==> ['40'] conf: 0.7637336901973905 support: 0.1294676784519232 lift: 1.3286931595755724  
 Rule 78 ] ['40'] ==> ['42'] conf: 0.22523926985693143 support: 0.1294676784519232 lift: 1.3286931595755727  
 Rule 79 ] ['311'] ==> ['40', '49'] conf: 0.5192752505782575 support: 0.015278864804165107 lift: 1.570922564210753  
 Rule 80 ] ['40', '49'] ==> ['311'] conf: 0.08901242193397844 support: 0.015278864804165107 lift: 3.025221330039119  
 Rule 81 ] ['111'] ==> ['40', '49'] conf: 0.3711524695776664 support: 0.01176257075123921 lift: 1.1228183676630517  
 Rule 82 ] ['40', '49'] ==> ['111'] conf: 0.09587536888339854 support: 0.01176257075123921 lift: 3.025221330039119  
 Rule 83 ] ['39'] ==> ['49', '111'] conf: 0.0872659656322134 support: 0.015437665180748857 lift: 5.574967243551859  
 Rule 84 ] ['49', '111'] ==> ['39'] conf: 11.30144927536232 support: 0.015437665180748857 lift: 63.88478260869566  
 Rule 85 ] ['111'] ==> ['49', '39'] conf: 0.48711524695776665 support: 0.015437665180748857 lift: 5.405912296959173  
 Rule 86 ] ['49', '39'] ==> ['111'] conf: 0.3517119838872105 support: 0.015437665180748857 lift: 11.097809667673717  
 Rule 87 ] ['226'] ==> ['40', '49'] conf: 0.4298434141848327 support: 0.015880037658375017 lift: 1.3003714651687954  
 Rule 88 ] ['40', '49'] ==> ['226'] conf: 0.11176309107130601 support: 0.015880037658375017 lift: 3.025221330039119  
 Rule 89 ] ['476'] ==> ['40', '49'] conf: 0.5039224734656207 support: 0.012386429373532515 lift: 1.5244770154142677  
 Rule 90 ] ['40', '49'] ==> ['476'] conf: 0.07436003019696659 support: 0.012386429373532515 lift: 3.0252213300391193  
 Rule 91 ] ['238'] ==> ['40', '49'] conf: 0.41029023746701854 support: 0.014110547747870374 lift: 1.2412187778920398

Rule 92 ] ['40', '49'] ==> ['238'] conf: 0.10404227575320843 support: 0.014110547747870374 lift: 3.025221330039119  
 Rule 93 ] ['66'] ==> ['40', '49'] conf: 0.40183363148479434 support: 0.020383162622928507 lift: 1.2156356730948787  
 Rule 94 ] ['40', '49'] ==> ['66'] conf: 0.153455493789033 support: 0.020383162622928507 lift: 3.025221330039119  
 Rule 95 ] ['39'] ==> ['49', '33'] conf: 0.10553988202103104 support: 0.018670387132632343 lift: 1.1581405948289913  
 Rule 96 ] ['49', '33'] ==> ['39'] conf: 1.9412496888225041 support: 0.018670387132632343 lift: 10.973487677371171  
 Rule 97 ] ['33'] ==> ['49', '39'] conf: 0.10852508736071734 support: 0.018670387132632343 lift: 1.2043907636969033  
 Rule 98 ] ['49', '39'] ==> ['33'] conf: 1.9092396777442096 support: 0.018670387132632343 lift: 11.097809667673715  
 Rule 99 ] ['39'] ==> ['40', '33'] conf: 0.11797896896640164 support: 0.02087090663672145 lift: 1.2301766863449952  
 Rule 100 ] ['40', '33'] ==> ['39'] conf: 1.8445890005913659 support: 0.02087090663672145 lift: 10.427084565345949  
 Rule 101 ] ['33'] ==> ['40', '39'] conf: 0.12131601503263663 support: 0.02087090663672145 lift: 1.0338657516957253  
 Rule 102 ] ['40', '39'] ==> ['33'] conf: 1.4661188980183664 support: 0.02087090663672145 lift: 8.52208796520058  
 Rule 103 ] ['33'] ==> ['49', '42'] conf: 0.13601898859365727 support: 0.02340036977801976 lift: 1.3297371982041937  
 Rule 104 ] ['49', '42'] ==> ['33'] conf: 1.681858505211799 support: 0.02340036977801976 lift: 9.776114437791085  
 Rule 105 ] ['42'] ==> ['49', '33'] conf: 0.1380394780863165 support: 0.02340036977801976 lift: 1.5147745117709421  
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 Rule 109 ] ['42'] ==> ['40', '33'] conf: 0.1578454332552693 support: 0.026757863454361906 lift: 1.6458676808063628  
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 Rule 127 ] ['39'] ==> ['40', '111'] conf: 0.11156706847909721 support: 0.01973661823255181 lift: 5.591736398058948  
 Rule 128 ] ['40', '111'] ==> ['39'] conf: 8.866401364411598 support: 0.01973661823255181 lift: 50.119954519613415  
 Rule 129 ] ['111'] ==> ['40', '39'] conf: 0.6227630637079457 support: 0.01973661823255181 lift: 5.307241610396925  
 Rule 130 ] ['40', '39'] ==> ['111'] conf: 0.27008216529724505 support: 0.01973661823255181 lift: 8.52208796520058  
 Rule 131 ] ['90'] ==> ['40', '49'] conf: 0.5538180870471723 support: 0.024103628588604938 lift: 1.6754222898965672  
 Rule 132 ] ['40', '49'] ==> ['90'] conf: 0.13166563722462427 support: 0.024103628588604938 lift: 3.0252213300391193  
 Rule 133 ] ['49'] ==> ['40', '90'] conf: 0.05043313160080693 support: 0.024103628588604938 lift: 1.6174009876532338  
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 Rule 135 ] ['102'] ==> ['40', '49'] conf: 0.4228877961555655 support: 0.010730368303444834 lift: 1.2793291811430516

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 Rule 138 ] ['40', '49'] ==> ['42'] conf: 0.5128337107954156 support: 0.083551683851136 lift: 3.0252213300391193  
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 Rule 142 ] ['49', '42'] ==> ['40'] conf: 5.619316921712132 support: 0.083551683851136 lift: 9.776114437791085  
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 Rule 151 ] ['37'] ==> ['49', '39'] conf: 0.4632152588555859 support: 0.015426322296707162 lift: 5.140674777941504  
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 Rule 154 ] ['49', '37'] ==> ['39'] conf: 11.01412429378531 support: 0.015426322296707162 lift: 62.260593220338976  
 Rule 155 ] ['39'] ==> ['40', '49'] conf: 0.3912541677353168 support: 0.06921427842243169 lift: 1.1836304536995836  
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 Rule 159 ] ['40'] ==> ['49', '39'] conf: 0.120414405525407 support: 0.06921427842243169 lift: 1.336336153767045  
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 Rule 161 ] ['39'] ==> ['40', '42'] conf: 0.1956270838676584 support: 0.034607139211215845 lift: 1.511010981326146  
 Rule 162 ] ['40', '42'] ==> ['39'] conf: 1.3663921499912386 support: 0.034607139211215845 lift: 7.723935517785175  
 Rule 163 ] ['42'] ==> ['40', '39'] conf: 0.20414854466376714 support: 0.034607139211215845 lift: 1.739771855592303  
 Rule 164 ] ['40', '39'] ==> ['42'] conf: 1.444659255679072 support: 0.034607139211215845 lift: 8.52208796520058  
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 Rule 166 ] ['42', '39'] ==> ['40'] conf: 13.00359250705671 support: 0.034607139211215845 lift: 22.622786759045418  
 Rule 167 ] ['37'] ==> ['40', '39'] conf: 0.662465940054496 support: 0.02206190946109958 lift: 5.645593015093709  
 Rule 168 ] ['40', '39'] ==> ['37'] conf: 0.28380860318994683 support: 0.02206190946109958 lift: 8.52208796520058  
 Rule 169 ] ['39'] ==> ['40', '37'] conf: 0.12471146447807131 support: 0.02206190946109958 lift: 5.397490142293198  
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 Rule 171 ] ['111', '39'] ==> ['40', '49'] conf: 0.378348623853211 support: 0.011694513446989031 lift: 1.1445883270716812  
 Rule 172 ] ['40', '39'] ==> ['49', '111'] conf: 0.09966167230546157 support: 0.011694513446989031 lift: 6.366864269653476  
 Rule 173 ] ['40', '111'] ==> ['49', '39'] conf: 0.5861284820920978 support: 0.011694513446989031 lift: 6.5047423350606035  
 Rule 174 ] ['49', '39'] ==> ['40', '111'] conf: 0.12978348439073514 support: 0.011694513446989031 lift: 6.504742335060603  
 Rule 175 ] ['49', '111'] ==> ['40', '39'] conf: 0.7471014492753623 support: 0.011694513446989031 lift: 6.366864269653476  
 Rule 176 ] ['39'] ==> ['40', '49', '111'] conf: 0.06610669402410875 support: 0.011694513446989031 lift: 5.62008896032734  
 Rule 177 ] ['40', '49', '111'] ==> ['39'] conf: 15.039537126325941 support: 0.011694513446989031 lift: 85.01542912246866  
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 Rule 182 ] ['40', '33'] ==> ['49', '39'] conf: 0.14618568894145476 support: 0.014019804675536802 lift: 1.6223409520100192  
 Rule 183 ] ['49', '39'] ==> ['40', '33'] conf: 0.1555891238670695 support: 0.014019804675536802 lift: 1.6223409520100194  
 Rule 184 ] ['49', '33'] ==> ['40', '39'] conf: 0.15384615384615383 support: 0.014019804675536802 lift: 1.3110904561847045  
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 Rule 186 ] ['40', '49', '33'] ==> ['39'] conf: 2.887078859681599 support: 0.014019804675536802 lift: 16.32006664198445  
 Rule 187 ] ['33'] ==> ['40', '49', '39'] conf: 0.08149271444583635 support: 0.014019804675536802 lift: 1.177397443175906  
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 Rule 189 ] ['40', '42'] ==> ['49', '33'] conf: 0.14420886630453827 support: 0.018670387132632343 lift: 1.5824742173605175  
 Rule 190 ] ['40', '33'] ==> ['49', '42'] conf: 0.1946777054997043 support: 0.018670387132632343 lift: 1.9031915274517002  
 Rule 191 ] ['42', '33'] ==> ['40', '49'] conf: 0.5150187734668336 support: 0.018670387132632343 lift: 1.55804577886245  
 Rule 192 ] ['40', '49'] ==> ['42', '33'] conf: 0.05648205339372727 support: 0.018670387132632343 lift: 1.55804577886245  
 Rule 193 ] ['49', '42'] ==> ['40', '33'] conf: 0.18252384120647594 support: 0.018670387132632343 lift: 1.9031915274517002  
 Rule 194 ] ['49', '33'] ==> ['40', '42'] conf: 0.2048792631316903 support: 0.018670387132632343 lift: 1.5824742173605175  
 Rule 195 ] ['42'] ==> ['40', '49', '33'] conf: 0.11013716962194714 support: 0.018670387132632343 lift: 1.7974459479897227  
 Rule 196 ] ['40', '49', '33'] ==> ['42'] conf: 2.7665679378008146 support: 0.018670387132632343 lift: 16.32006664198445  
 Rule 197 ] ['33'] ==> ['40', '49', '42'] conf: 0.10852508736071734 support: 0.018670387132632343 lift: 1.2988976685865057  
 Rule 198 ] ['40', '49', '42'] ==> ['33'] conf: 2.059055118110236 support: 0.018670387132632343 lift: 11.96863969590008  
 Rule 199 ] ['171', '39'] ==> ['40', '49'] conf: 0.39359947212141205 support: 0.013532060661743854 lift: 1.1907255185538332  
 Rule 200 ] ['40', '39'] ==> ['171', '49'] conf: 0.1153214113098115 support: 0.013532060661743854 lift: 6.529769391447843  
 Rule 201 ] ['40', '171'] ==> ['49', '39'] conf: 0.5794074793589121 support: 0.013532060661743854 lift: 6.430153925951794  
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 Rule 204 ] ['39'] ==> ['40', '49', '171'] conf: 0.07649397281354194 support: 0.013532060661743854 lift: 5.591861639481484  
 Rule 205 ] ['40', '49', '171'] ==> ['39'] conf: 12.93200663349917 support: 0.013532060661743854 lift: 73.10199004975125  
 Rule 206 ] ['171'] ==> ['40', '49', '39'] conf: 0.3849628912552436 support: 0.013532060661743854 lift: 5.561899943617425  
 Rule 207 ] ['40', '49', '39'] ==> ['171'] conf: 0.507866273352999 support: 0.013532060661743854 lift: 14.447885939036382  
 Rule 208 ] ['37', '39'] ==> ['40', '49'] conf: 0.38709677419354843 support: 0.012250314765032157 lift: 1.171053418079659  
 Rule 209 ] ['40', '37'] ==> ['49', '39'] conf: 0.5301914580265096 support: 0.012250314765032157 lift: 5.883963888604621  
 Rule 210 ] ['40', '39'] ==> ['49', '37'] conf: 0.10439826002899952 support: 0.012250314765032157 lift: 6.4998976005767135  
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 Rule 214 ] ['40', '49', '39'] ==> ['37'] conf: 0.4811537200917731 support: 0.012250314765032157 lift: 14.44788593903638  
 Rule 215 ] ['39'] ==> ['40', '49', '37'] conf: 0.06924852526288792 support: 0.012250314765032157 lift: 5.470447343818514  
 Rule 216 ] ['40', '49', '37'] ==> ['39'] conf: 13.974910394265232 support: 0.012250314765032157 lift: 78.99731182795698  
 Rule 217 ] ['40', '39'] ==> ['49', '42'] conf: 0.19246012566457227 support: 0.022583682127017616 lift: 1.8815122132085116  
 Rule 218 ] ['42', '39'] ==> ['40', '49'] conf: 0.5109058249935848 support: 0.022583682127017616 lift: 1.545603199411826  
 Rule 219 ] ['40', '42'] ==> ['49', '39'] conf: 0.17443490450324162 support: 0.022583682127017616 lift: 1.9358453695758162  
 Rule 220 ] ['49', '39'] ==> ['40', '42'] conf: 0.2506294058408862 support: 0.022583682127017616 lift: 1.9358453695758164  
 Rule 221 ] ['40', '49'] ==> ['42', '39'] conf: 0.06832063688147691 support: 0.022583682127017616 lift: 1.545603199411826  
 Rule 222 ] ['49', '42'] ==> ['40', '39'] conf: 0.2207806609004214 support: 0.022583682127017616 lift: 1.8815122132085114  
 Rule 223 ] ['39'] ==> ['40', '49', '42'] conf: 0.12766093870223136 support: 0.022583682127017616 lift: 1.527927778567393

Rule 224 ] ['40', '49', '42'] ==> ['39'] conf: 2.1172956828672276 support: 0.022583682127017616 lift: 11.96863969590008  
 Rule 225 ] ['42'] ==> ['40', '49', '39'] conf: 0.13322181331549013 support: 0.022583682127017616 lift: 1.9247735633737995  
 Rule 226 ] ['40', '49', '39'] ==> ['42'] conf: 2.4491969845952144 support: 0.022583682127017616 lift: 14.447885939036379  
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 [['1328'], ['476'], ['439'], ['414'], ['311'], ['272'], ['238'], ['226'], ['171'], ['148'], ['111'], ['90'], ['102'], ['66'], ['49'], ['42'], ['40'], ['39'],  
 , ['37'], ['33']] length: 20  
 [['40', '311'], ['40', '226'], ['49', '66'], ['238', '40'], ['40', '66'], ['33', '39'], ['40', '33'], ['49', '33'], ['171', '39'], ['171', '40'], ['111', '39'], [  
 '40', '90'], ['49', '90'], ['49', '42'], ['42', '33'], ['49', '39'], ['40', '49'], ['37', '39'], ['40', '37'], ['40', '39'], ['42', '39'], ['40', '42']] length: 2  
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 [['40', '49', '66'], ['40', '33', '39'], ['49', '42', '33'], ['40', '42', '33'], ['40', '49', '33'], ['171', '40', '39'], ['40', '49', '90'], ['40', '49', '42'], ['4  
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 No of frequent sets: 55  
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 Rule 2 ] ['226'] ==> ['40'] conf: 0.7218299048203869 support: 0.026667120382028335 lift: 1.255791736336855  
 Rule 3 ] ['66'] ==> ['49'] conf: 0.5655187835420393 support: 0.0286861537414503 lift: 1.1832609819829056  
 Rule 4 ] ['49'] ==> ['66'] conf: 0.06002135991456034 support: 0.0286861537414503 lift: 1.1832609819829056  
 Rule 5 ] ['238'] ==> ['40'] conf: 0.6362137203166227 support: 0.021880423316432435 lift: 1.1068423837559698  
 Rule 6 ] ['66'] ==> ['40'] conf: 0.623211091234347 support: 0.03161261782420798 lift: 1.0842212730993837  
 Rule 7 ] ['40'] ==> ['66'] conf: 0.054997533300444004 support: 0.03161261782420798 lift: 1.0842212730993837  
 Rule 8 ] ['39'] ==> ['33'] conf: 0.18164914080533473 support: 0.03213439049012602 lift: 1.0558693151275211  
 Rule 9 ] ['33'] ==> ['39'] conf: 0.1867871035801411 support: 0.03213439049012602 lift: 1.0558693151275211  
 Rule 10 ] ['33'] ==> ['40'] conf: 0.5574602755983384 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 11 ] ['40'] ==> ['33'] conf: 0.16684755796743955 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 12 ] ['33'] ==> ['49'] conf: 0.5297026438979363 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 13 ] ['49'] ==> ['33'] conf: 0.19067283730865078 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 14 ] ['39'] ==> ['171'] conf: 0.1943447037701975 support: 0.03438028153038192 lift: 5.5287587702756955  
 Rule 15 ] ['171'] ==> ['39'] conf: 0.9780574378831881 support: 0.03438028153038192 lift: 5.5287587702756955  
 Rule 16 ] ['171'] ==> ['40'] conf: 0.664407873507583 support: 0.023354998241852973 lift: 1.1558926992856837  
 Rule 17 ] ['39'] ==> ['111'] conf: 0.17472428827904593 support: 0.030909359013622805 lift: 5.513195411227262  
 Rule 18 ] ['111'] ==> ['39'] conf: 0.9753042233357194 support: 0.030909359013622805 lift: 5.513195411227261  
 Rule 19 ] ['90'] ==> ['40'] conf: 0.7164451394318478 support: 0.03118158823062352 lift: 1.2464236790814234  
 Rule 20 ] ['40'] ==> ['90'] conf: 0.054247656635421804 support: 0.03118158823062352 lift: 1.2464236790814236  
 Rule 21 ] ['90'] ==> ['49'] conf: 0.729215532968465 support: 0.031737389548666645 lift: 1.5257712258700094  
 Rule 22 ] ['49'] ==> ['90'] conf: 0.06640560104426249 support: 0.031737389548666645 lift: 1.5257712258700094  
 Rule 23 ] ['42'] ==> ['49'] conf: 0.6034125125460019 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 24 ] ['49'] ==> ['42'] conf: 0.2140263438946244 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 25 ] ['33'] ==> ['42'] conf: 0.2107206435023406 support: 0.036251857397261826 lift: 1.2430473504054766  
 Rule 26 ] ['42'] ==> ['33'] conf: 0.21385078621612577 support: 0.036251857397261826 lift: 1.2430473504054766  
 Rule 27 ] ['39'] ==> ['49'] conf: 0.5093613747114645 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 28 ] ['49'] ==> ['39'] conf: 0.1885368458526166 support: 0.09010787082723654 lift: 1.0657602505265793

Rule 29 ] ['49'] ==> ['40'] conf: 0.6916340334638661 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 30 ] ['40'] ==> ['49'] conf: 0.5750764676862358 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 31 ] ['39'] ==> ['37'] conf: 0.1788920235957938 support: 0.03164664647633307 lift: 5.371696080459393  
 Rule 32 ] ['37'] ==> ['39'] conf: 0.9502724795640327 support: 0.03164664647633307 lift: 5.371696080459393  
 Rule 33 ] ['37'] ==> ['40'] conf: 0.6938010899182562 support: 0.023105454792935652 lift: 1.2070290653829971  
 Rule 34 ] ['39'] ==> ['40'] conf: 0.6633111054116441 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 35 ] ['40'] ==> ['39'] conf: 0.20414405525407003 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 36 ] ['39'] ==> ['42'] conf: 0.24987176199025393 support: 0.044203219110491035 lift: 1.4740009641233038  
 Rule 37 ] ['42'] ==> ['39'] conf: 0.2607561057209769 support: 0.044203219110491035 lift: 1.4740009641233038  
 Rule 38 ] ['42'] ==> ['40'] conf: 0.7637336901973905 support: 0.1294676784519232 lift: 1.3286931595755724  
 Rule 39 ] ['40'] ==> ['42'] conf: 0.22523926985693143 support: 0.1294676784519232 lift: 1.3286931595755727  
 Rule 40 ] ['66'] ==> ['40', '49'] conf: 0.40183363148479434 support: 0.020383162622928507 lift: 1.2156356730948787  
 Rule 41 ] ['40', '49'] ==> ['66'] conf: 0.153455493789033 support: 0.020383162622928507 lift: 3.025221330039119  
 Rule 42 ] ['39'] ==> ['40', '33'] conf: 0.11797896896640164 support: 0.02087090663672145 lift: 1.2301766863449952  
 Rule 43 ] ['40', '33'] ==> ['39'] conf: 1.8445890005913659 support: 0.02087090663672145 lift: 10.427084565345949  
 Rule 44 ] ['33'] ==> ['40', '39'] conf: 0.12131601503263663 support: 0.02087090663672145 lift: 1.0338657516957253  
 Rule 45 ] ['40', '39'] ==> ['33'] conf: 1.4661188980183664 support: 0.02087090663672145 lift: 8.52208796520058  
 Rule 46 ] ['33'] ==> ['49', '42'] conf: 0.13601898859365727 support: 0.02340036977801976 lift: 1.3297371982041937  
 Rule 47 ] ['49', '42'] ==> ['33'] conf: 1.681858505211799 support: 0.02340036977801976 lift: 9.776114437791085  
 Rule 48 ] ['42'] ==> ['49', '33'] conf: 0.1380394780863165 support: 0.02340036977801976 lift: 1.5147745117709421  
 Rule 49 ] ['49', '33'] ==> ['42'] conf: 1.860219068956933 support: 0.02340036977801976 lift: 10.973487677371171  
 Rule 50 ] ['33'] ==> ['40', '42'] conf: 0.15553504318586403 support: 0.026757863454361906 lift: 1.2013426443235464  
 Rule 51 ] ['40', '42'] ==> ['33'] conf: 1.3288067285789382 support: 0.026757863454361906 lift: 7.7239355177851765  
 Rule 52 ] ['42'] ==> ['40', '33'] conf: 0.1578454332552693 support: 0.026757863454361906 lift: 1.6458676808063628  
 Rule 53 ] ['40', '33'] ==> ['42'] conf: 1.7675931401537552 support: 0.026757863454361906 lift: 10.427084565345949  
 Rule 54 ] ['33'] ==> ['40', '49'] conf: 0.35616799630777346 support: 0.06127425959324418 lift: 1.0774870195075705  
 Rule 55 ] ['40', '49'] ==> ['33'] conf: 0.5204515819092719 support: 0.06127425959324418 lift: 3.025221330039119  
 Rule 56 ] ['49'] ==> ['40', '33'] conf: 0.1282069538388513 support: 0.06127425959324418 lift: 1.336824749543107  
 Rule 57 ] ['40', '33'] ==> ['49'] conf: 4.983441750443524 support: 0.06127425959324418 lift: 10.427084565345949  
 Rule 58 ] ['40'] ==> ['49', '33'] conf: 0.10660088801184016 support: 0.06127425959324418 lift: 1.1697835309947522  
 Rule 59 ] ['49', '33'] ==> ['40'] conf: 6.307567836694051 support: 0.06127425959324418 lift: 10.973487677371173  
 Rule 60 ] ['39'] ==> ['171', '40'] conf: 0.12945627083867658 support: 0.022901282880185114 lift: 5.542979258576283  
 Rule 61 ] ['171', '40'] ==> ['39'] conf: 7.574550752792618 support: 0.022901282880185114 lift: 42.817387081107334  
 Rule 62 ] ['171'] ==> ['40', '39'] conf: 0.6515004840271055 support: 0.022901282880185114 lift: 5.552144434249748  
 Rule 63 ] ['40', '39'] ==> ['171'] conf: 0.29956500724987917 support: 0.022901282880185114 lift: 8.52208796520058  
 Rule 64 ] ['90'] ==> ['40', '49'] conf: 0.5538180870471723 support: 0.024103628588604938 lift: 1.6754222898965672  
 Rule 65 ] ['40', '49'] ==> ['90'] conf: 0.13166563722462427 support: 0.024103628588604938 lift: 3.0252213300391193  
 Rule 66 ] ['49'] ==> ['40', '90'] conf: 0.05043313160080693 support: 0.024103628588604938 lift: 1.6174009876532338  
 Rule 67 ] ['40', '90'] ==> ['49'] conf: 15.327391778828664 support: 0.024103628588604938 lift: 32.070207348126594  
 Rule 68 ] ['42'] ==> ['40', '49'] conf: 0.4928738708598194 support: 0.083551683851136 lift: 1.4910525471440716  
 Rule 69 ] ['40', '49'] ==> ['42'] conf: 0.5128337107954156 support: 0.083551683851136 lift: 3.0252213300391193  
 Rule 70 ] ['49'] ==> ['40', '42'] conf: 0.17481903405719712 support: 0.083551683851136 lift: 1.3502909463392812  
 Rule 71 ] ['40', '42'] ==> ['49'] conf: 3.691519186963378 support: 0.083551683851136 lift: 7.723935517785176  
 Rule 72 ] ['40'] ==> ['49', '42'] conf: 0.14535767143561915 support: 0.083551683851136 lift: 1.4210332303654492



Rule 73 ] ['49', '42'] ==> ['40'] conf: 5.619316921712132 support: 0.083551683851136 lift: 9.776114437791085  
 Rule 74 ] ['39'] ==> ['49', '42'] conf: 0.15221851756860733 support: 0.02692800671498735 lift: 1.488105647301618  
 Rule 75 ] ['49', '42'] ==> ['39'] conf: 1.7294300288312265 support: 0.02692800671498735 lift: 9.776114437791085  
 Rule 76 ] ['42'] ==> ['49', '39'] conf: 0.15884911341585814 support: 0.02692800671498735 lift: 1.762877226567909  
 Rule 77 ] ['49', '39'] ==> ['42'] conf: 1.881294058408862 support: 0.02692800671498735 lift: 11.097809667673715  
 Rule 78 ] ['49'] ==> ['42', '39'] conf: 0.05634270796250148 support: 0.02692800671498735 lift: 1.2746290676628413  
 Rule 79 ] ['42', '39'] ==> ['49'] conf: 10.812163202463433 support: 0.02692800671498735 lift: 22.622786759045418  
 Rule 80 ] ['39'] ==> ['40', '49'] conf: 0.3912541677353168 support: 0.06921427842243169 lift: 1.1836304536995836  
 Rule 81 ] ['40', '49'] ==> ['39'] conf: 0.535172603115778 support: 0.06921427842243169 lift: 3.0252213300391193  
 Rule 82 ] ['49'] ==> ['40', '39'] conf: 0.14482022071911713 support: 0.06921427842243169 lift: 1.2341706601080797  
 Rule 83 ] ['40', '39'] ==> ['49'] conf: 4.072982116964717 support: 0.06921427842243169 lift: 8.52208796520058  
 Rule 84 ] ['40'] ==> ['49', '39'] conf: 0.120414405525407 support: 0.06921427842243169 lift: 1.336336153767045  
 Rule 85 ] ['49', '39'] ==> ['40'] conf: 6.379028197381672 support: 0.06921427842243169 lift: 11.097809667673715  
 Rule 86 ] ['39'] ==> ['40', '42'] conf: 0.1956270838676584 support: 0.034607139211215845 lift: 1.511010981326146  
 Rule 87 ] ['40', '42'] ==> ['39'] conf: 1.3663921499912386 support: 0.034607139211215845 lift: 7.723935517785175  
 Rule 88 ] ['42'] ==> ['40', '39'] conf: 0.20414854466376714 support: 0.034607139211215845 lift: 1.739771855592303  
 Rule 89 ] ['40', '39'] ==> ['42'] conf: 1.444659255679072 support: 0.034607139211215845 lift: 8.52208796520058  
 Rule 90 ] ['40'] ==> ['42', '39'] conf: 0.0602072027627035 support: 0.034607139211215845 lift: 1.3620547094592514  
 Rule 91 ] ['42', '39'] ==> ['40'] conf: 13.00359250705671 support: 0.034607139211215845 lift: 22.622786759045418  
 Rule 92 ] ['37'] ==> ['40', '39'] conf: 0.662465940054496 support: 0.02206190946109958 lift: 5.645593015093709  
 Rule 93 ] ['40', '39'] ==> ['37'] conf: 0.28380860318994683 support: 0.02206190946109958 lift: 8.52208796520058  
 Rule 94 ] ['39'] ==> ['40', '37'] conf: 0.12471146447807131 support: 0.02206190946109958 lift: 5.397490142293198  
 Rule 95 ] ['40', '37'] ==> ['39'] conf: 7.656357388316151 support: 0.02206190946109958 lift: 43.27982326951399  
 Rule 96 ] ['40', '39'] ==> ['49', '42'] conf: 0.19246012566457227 support: 0.022583682127017616 lift: 1.8815122132085116  
 Rule 97 ] ['42', '39'] ==> ['40', '49'] conf: 0.5109058249935848 support: 0.022583682127017616 lift: 1.545603199411826  
 Rule 98 ] ['40', '42'] ==> ['49', '39'] conf: 0.17443490450324162 support: 0.022583682127017616 lift: 1.9358453695758162  
 Rule 99 ] ['49', '39'] ==> ['40', '42'] conf: 0.2506294058408862 support: 0.022583682127017616 lift: 1.9358453695758164  
 Rule 100 ] ['40', '49'] ==> ['42', '39'] conf: 0.06832063688147691 support: 0.022583682127017616 lift: 1.545603199411826  
 Rule 101 ] ['49', '42'] ==> ['40', '39'] conf: 0.2207806609004214 support: 0.022583682127017616 lift: 1.8815122132085114  
 Rule 102 ] ['39'] ==> ['40', '49', '42'] conf: 0.12766093870223136 support: 0.022583682127017616 lift: 1.527927778567393  
 Rule 103 ] ['40', '49', '42'] ==> ['39'] conf: 2.1172956828672276 support: 0.022583682127017616 lift: 11.96863969590008  
 Rule 104 ] ['42'] ==> ['40', '49', '39'] conf: 0.13322181331549013 support: 0.022583682127017616 lift: 1.9247735633737995  
 Rule 105 ] ['40', '49', '39'] ==> ['42'] conf: 2.4491969845952144 support: 0.022583682127017616 lift: 14.447885939036379  
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 [['66'], ['49'], ['42'], ['40'], ['39'], ['33']] length: 6  
 [['40', '33'], ['49', '33'], ['49', '42'], ['49', '39'], ['40', '49'], ['40', '39'], ['40', '42']] length: 7  
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 [] length: 0  
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 No of Candidate sets: 16497  
 No of frequent sets: 16  
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 Rule 2 ] ['40'] ==> ['33'] conf: 0.16684755796743955 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 3 ] ['33'] ==> ['49'] conf: 0.5297026438979363 support: 0.09112873039098922 lift: 1.1083212243665828

Rule 4 ] ['49'] ==> ['33'] conf: 0.19067283730865078 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 5 ] ['42'] ==> ['49'] conf: 0.6034125125460019 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 6 ] ['49'] ==> ['42'] conf: 0.2140263438946244 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 7 ] ['39'] ==> ['49'] conf: 0.5093613747114645 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 8 ] ['49'] ==> ['39'] conf: 0.1885368458526166 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 9 ] ['49'] ==> ['40'] conf: 0.6916340334638661 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 10 ] ['40'] ==> ['49'] conf: 0.5750764676862358 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 11 ] ['39'] ==> ['40'] conf: 0.6633111054116441 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 12 ] ['40'] ==> ['39'] conf: 0.20414405525407003 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 13 ] ['42'] ==> ['40'] conf: 0.7637336901973905 support: 0.1294676784519232 lift: 1.3286931595755724  
 Rule 14 ] ['40'] ==> ['42'] conf: 0.22523926985693143 support: 0.1294676784519232 lift: 1.3286931595755727  
 Rule 15 ] ['33'] ==> ['40', '49'] conf: 0.35616799630777346 support: 0.06127425959324418 lift: 1.0774870195075705  
 Rule 16 ] ['40', '49'] ==> ['33'] conf: 0.5204515819092719 support: 0.06127425959324418 lift: 3.025221330039119  
 Rule 17 ] ['49'] ==> ['40', '33'] conf: 0.1282069538388513 support: 0.06127425959324418 lift: 1.336824749543107  
 Rule 18 ] ['40', '33'] ==> ['49'] conf: 4.983441750443524 support: 0.06127425959324418 lift: 10.427084565345949  
 Rule 19 ] ['40'] ==> ['49', '33'] conf: 0.10660088801184016 support: 0.06127425959324418 lift: 1.1697835309947522  
 Rule 20 ] ['49', '33'] ==> ['40'] conf: 6.307567836694051 support: 0.06127425959324418 lift: 10.973487677371173  
 Rule 21 ] ['42'] ==> ['40', '49'] conf: 0.4928738708598194 support: 0.083551683851136 lift: 1.4910525471440716  
 Rule 22 ] ['40', '49'] ==> ['42'] conf: 0.5128337107954156 support: 0.083551683851136 lift: 3.0252213300391193  
 Rule 23 ] ['49'] ==> ['40', '42'] conf: 0.17481903405719712 support: 0.083551683851136 lift: 1.3502909463392812  
 Rule 24 ] ['40', '42'] ==> ['49'] conf: 3.691519186963378 support: 0.083551683851136 lift: 7.723935517785176  
 Rule 25 ] ['40'] ==> ['49', '42'] conf: 0.14535767143561915 support: 0.083551683851136 lift: 1.4210332303654492  
 Rule 26 ] ['49', '42'] ==> ['40'] conf: 5.619316921712132 support: 0.083551683851136 lift: 9.776114437791085  
 Rule 27 ] ['39'] ==> ['40', '49'] conf: 0.3912541677353168 support: 0.06921427842243169 lift: 1.1836304536995836  
 Rule 28 ] ['40', '49'] ==> ['39'] conf: 0.535172603115778 support: 0.06921427842243169 lift: 3.0252213300391193  
 Rule 29 ] ['49'] ==> ['40', '39'] conf: 0.14482022071911713 support: 0.06921427842243169 lift: 1.2341706601080797  
 Rule 30 ] ['40', '39'] ==> ['49'] conf: 4.072982116964717 support: 0.06921427842243169 lift: 8.52208796520058  
 Rule 31 ] ['40'] ==> ['49', '39'] conf: 0.120414405525407 support: 0.06921427842243169 lift: 1.336336153767045  
 Rule 32 ] ['49', '39'] ==> ['40'] conf: 6.379028197381672 support: 0.06921427842243169 lift: 11.097809667673715

```

MinSups = [0.01, 0.02, 0.05]
samples = [0.1,0.2,0.3]
SLSet = []
SSupSet = []
for ms in MinSups:
    for s in samples:
        print("-----FOR ",ms," MIN SUPPORT threshold----- ")
        print("-----FOR ",s," SAMPLE DATA-----")
        SLSet.append(L)
        SSupSet.append(suppData)
        sample = sampling(newlol,s)
        start = datetime.now()
        L,suppData,candidateSetsCount = myapriori(sample,ms) # 0.1, 0.2, 0.3
        for i in L:
            print([list(x) for x in i], '-----Length:', len(i))
        print('Execution Time:',datetime.now()-start)
        print('No of Candidate sets:', (candidateSetsCount))

```

```

        print('No of frequent sets:',
len(list(itertools.chain.from_iterable(L))))
        rules= generateRules(L,suppData, minConf=0.05)
        for n,i in enumerate(rules):
            print('Rule',n+1,' ',list(i[0]),'==>',list(i[1]),'conf:',i[2],
'support:',i[3], 'lift:', i[2]/i[4])

```

-----FOR 0.01 MIN SUPPORT threshold-----

-----FOR 0.1 SAMPLE DATA-----

Frequent set:

[[['16011'], ['77'], ['480'], ['13042'], ['605'], ['38'], ['414'], ['10'], ['256'], ['390'], ['678'], ['180'], ['265'], ['2239'], ['15833'], ['230'], ['476'], ['61'], ['2959'], ['148'], ['250'], ['957'], ['259'], ['14099'], ['784'], ['171'], ['124'], ['549'], ['50'], ['339'], ['545'], ['534'], ['1394'], ['32'], ['20'], ['79'], ['238'], ['825'], ['80'], ['104'], ['271'], ['12926'], ['90'], ['243'], ['593'], ['186'], ['16218'], ['37'], ['272'], ['1147'], ['590'], ['523'], ['1328'], ['162'], ['111'], ['439'], ['39'], ['287'], ['741'], ['311'], ['118'], ['202'], ['1005'], ['66'], ['550'], ['33'], ['302'], ['102'], ['42'], ['406'], ['49'], ['40'], ['226'], ['176']] -----Length: 74

[[['49', '148'], ['476', '49'], ['40', '414'], ['38', '39'], ['49', '414'], ['49', '37'], ['40', '256'], ['49', '256'], ['49', '272'], ['40', '2239'], ['2239', '49'], ['171', '42'], ['476', '40'], ['171', '49'], ['40', '148'], ['49', '1328'], ['40', '14099'], ['40', '102'], ['171', '40'], ['171', '39'], ['238', '40'], ['238', '49'], ['50', '49'], ['42', '66'], ['40', '534'], ['40', '90'], ['49', '90'], ['40', '439'], ['49', '439'], ['40', '186'], ['80', '40'], ['80', '49'], ['40', '12926'], ['271', '40'], ['271', '49'], ['40', '272'], ['40', '37'], ['39', '37'], ['40', '1147'], ['40', '1328'], ['40', '111'], ['49', '111'], ['111', '39'], ['42', '39'], ['40', '287'], ['40', '39'], ['49', '39'], ['33', '39'], ['287', '39'], ['40', '66'], ['49', '42'], ['40', '33'], ['42', '33'], ['40', '311'], ['49', '311'], ['49', '102'], ['49', '33'], ['49', '66'], ['40', '42'], ['40', '226'], ['49', '226'], ['40', '49']] -----Length: 62

[[['476', '49', '40'], ['40', '49', '37'], ['49', '39', '37'], ['171', '49', '39'], ['171', '49', '40'], ['40', '49', '102'], ['171', '39', '40'], ['238', '49', '40'], ['40', '49', '90'], ['40', '49', '66'], ['49', '42', '39'], ['40', '42', '39'], ['40', '39', '37'], ['49', '111', '39'], ['40', '49', '111'], ['40', '111', '39'], ['42', '33', '39'], ['49', '33', '39'], ['40', '49', '39'], ['40', '33', '39'], ['40', '287', '39'], ['40', '49', '42'], ['40', '49', '311'], ['40', '49', '33'], ['40', '42', '33'], ['49', '42', '33'], ['40', '49', '226']] -----Length: 27

[[['49', '40', '39', '37'], ['49', '40', '171', '39'], ['49', '42', '40', '39'], ['49', '40', '111', '39'], ['49', '33', '40', '39'], ['49', '42', '33', '40']] -----Length: 6

[] -----Length: 0

**Execution Time: 0:00:21.859403**

**No of Candidate sets: 13288**

**No of frequent sets: 169**

Rule 1 ] ['148'] ==> ['49'] conf: 0.5678391959798995 support: 0.012817604355716878 lift: 1.1756858505774528

Rule 2 ] ['476'] ==> ['49'] conf: 0.6375545851528384 support: 0.016560798548094374 lift: 1.320028469400522

Rule 3 ] ['414'] ==> ['40'] conf: 0.6086956521739131 support: 0.011116152450090745 lift: 1.0567666147233592

Rule 4 ] ['39'] ==> ['38'] conf: 0.0654320987654321 support: 0.012023593466424683 lift: 5.292196171706875

Rule 5 ] ['38'] ==> ['39'] conf: 0.9724770642201834 support: 0.012023593466424683 lift: 5.292196171706875

Rule 6 ] ['414'] ==> ['49'] conf: 0.6273291925465838 support: 0.011456442831215972 lift: 1.2988572478841434

Rule 7 ] ['37'] ==> ['49'] conf: 0.4581939799331104 support: 0.015539927404718693 lift: 0.9486702975787462

Rule 8 ] ['256'] ==> ['40'] conf: 0.7430555555555556 support: 0.012137023593466424 lift: 1.2900310708502911

Rule 9 ] ['256'] ==> ['49'] conf: 0.6944444444444445 support: 0.011343012704174229 lift: 1.4378163978915508

Rule 10 ] ['272'] ==> ['49'] conf: 0.47959183673469385 support: 0.010662431941923775 lift: 0.992973610298981

Rule 11 ] ['2239'] ==> ['40'] conf: 0.7388888888888889 support: 0.015086206896551725 lift: 1.282797251761411

Rule 12 ] ['2239'] ==> ['49'] conf: 0.5722222222222223 support: 0.011683303085299456 lift: 1.1847607118626378

Rule 13 ] ['42'] ==> ['171'] conf: 0.06095890410958904 support: 0.010095281306715064 lift: 1.5668037860936936

Rule 14 ] ['171'] ==> ['42'] conf: 0.2594752186588921 support: 0.010095281306715064 lift: 1.5668037860936936

Rule 15 ] ['476'] ==> ['40'] conf: 0.685589519650655 support: 0.01780852994555354 lift: 1.1902633330524173  
 Rule 16 ] ['171'] ==> ['49'] conf: 0.5014577259475219 support: 0.019509981851179675 lift: 1.0382459633521262  
 Rule 17 ] ['148'] ==> ['40'] conf: 0.6281407035175879 support: 0.014178765880217785 lift: 1.0905254907859503  
 Rule 18 ] ['1328'] ==> ['49'] conf: 0.5685279187817259 support: 0.012704174228675136 lift: 1.1771118205682705  
 Rule 19 ] ['14099'] ==> ['40'] conf: 0.6714285714285715 support: 0.010662431941923775 lift: 1.165678276036685  
 Rule 20 ] ['102'] ==> ['40'] conf: 0.6513761467889908 support: 0.016107078039927405 lift: 1.130864929124014  
 Rule 21 ] ['171'] ==> ['40'] conf: 0.6326530612244897 support: 0.024614337568058076 lift: 1.0983594698218002  
 Rule 22 ] ['39'] ==> ['171'] conf: 0.20679012345679013 support: 0.03799909255898366 lift: 5.315048770831083  
 Rule 23 ] ['171'] ==> ['39'] conf: 0.97667638483965 support: 0.03799909255898366 lift: 5.315048770831083  
 Rule 24 ] ['238'] ==> ['40'] conf: 0.6666666666666667 support: 0.02223230490018149 lift: 1.157411054220822  
 Rule 25 ] ['238'] ==> ['49'] conf: 0.5748299319727891 support: 0.019169691470054446 lift: 1.1901598591526794  
 Rule 26 ] ['50'] ==> ['49'] conf: 0.7833333333333333 support: 0.010662431941923775 lift: 1.621856896821669  
 Rule 27 ] ['66'] ==> ['42'] conf: 0.21171171171171171 support: 0.010662431941923775 lift: 1.27839071948661  
 Rule 28 ] ['42'] ==> ['66'] conf: 0.06438356164383562 support: 0.010662431941923775 lift: 1.27839071948661  
 Rule 29 ] ['534'] ==> ['40'] conf: 0.6375 support: 0.011569872958257713 lift: 1.1067743205986609  
 Rule 30 ] ['90'] ==> ['40'] conf: 0.7356020942408378 support: 0.03187386569872958 lift: 1.2770909930734986  
 Rule 31 ] ['40'] ==> ['90'] conf: 0.05533674675068925 support: 0.03187386569872958 lift: 1.2770909930734986  
 Rule 32 ] ['90'] ==> ['49'] conf: 0.7146596858638744 support: 0.030966424682395643 lift: 1.4796711579558282  
 Rule 33 ] ['49'] ==> ['90'] conf: 0.06411460779708783 support: 0.030966424682395643 lift: 1.4796711579558282  
 Rule 34 ] ['439'] ==> ['40'] conf: 0.6524064171122994 support: 0.013838475499092558 lift: 1.1326535985155637  
 Rule 35 ] ['439'] ==> ['49'] conf: 0.5935828877005348 support: 0.012590744101633394 lift: 1.2289870215988528  
 Rule 36 ] ['186'] ==> ['40'] conf: 0.6013071895424836 support: 0.010435571687840291 lift: 1.0439393822383884  
 Rule 37 ] ['80'] ==> ['40'] conf: 0.7470588235294118 support: 0.014405626134301271 lift: 1.2969812107592151  
 Rule 38 ] ['80'] ==> ['49'] conf: 0.6 support: 0.011569872958257713 lift: 1.2422733677782996  
 Rule 39 ] ['12926'] ==> ['40'] conf: 0.7234042553191489 support: 0.011569872958257713 lift: 1.2559141226651471  
 Rule 40 ] ['271'] ==> ['40'] conf: 0.7039106145251397 support: 0.014292196007259528 lift: 1.2220708896521528  
 Rule 41 ] ['271'] ==> ['49'] conf: 0.564245810055866 support: 0.011456442831215972 lift: 1.1682459045214926  
 Rule 42 ] ['272'] ==> ['40'] conf: 0.6836734693877551 support: 0.015199637023593466 lift: 1.1869368464203327  
 Rule 43 ] ['37'] ==> ['40'] conf: 0.7056856187290971 support: 0.023933756805807622 lift: 1.225152503882576  
 Rule 44 ] ['37'] ==> ['39'] conf: 0.9498327759197326 support: 0.03221415607985481 lift: 5.168966513894051  
 Rule 45 ] ['39'] ==> ['37'] conf: 0.17530864197530865 support: 0.03221415607985481 lift: 5.168966513894051  
 Rule 46 ] ['1147'] ==> ['40'] conf: 0.6934306569343066 support: 0.010775862068965518 lift: 1.2038764615070594  
 Rule 47 ] ['1328'] ==> ['40'] conf: 0.6243654822335025 support: 0.013951905626134301 lift: 1.083971266516455  
 Rule 48 ] ['111'] ==> ['40'] conf: 0.6195652173913044 support: 0.01939655172413793 lift: 1.0756374471291335  
 Rule 49 ] ['111'] ==> ['49'] conf: 0.5289855072463768 support: 0.016560798548094374 lift: 1.0952410126547811  
 Rule 50 ] ['39'] ==> ['111'] conf: 0.16419753086419756 support: 0.03017241379310345 lift: 5.244802290212919  
 Rule 51 ] ['111'] ==> ['39'] conf: 0.9637681159420292 support: 0.03017241379310345 lift: 5.244802290212919  
 Rule 52 ] ['39'] ==> ['42'] conf: 0.24382716049382716 support: 0.0448049001814882 lift: 1.4723152376120412  
 Rule 53 ] ['42'] ==> ['39'] conf: 0.2705479452054794 support: 0.0448049001814882 lift: 1.4723152376120412  
 Rule 54 ] ['287'] ==> ['40'] conf: 0.7165354330708661 support: 0.010322141560798548 lift: 1.2439890464656864  
 Rule 55 ] ['39'] ==> ['40'] conf: 0.6722222222222223 support: 0.12352540834845735 lift: 1.1670561463393287  
 Rule 56 ] ['40'] ==> ['39'] conf: 0.2144545096494683 support: 0.12352540834845735 lift: 1.1670561463393287  
 Rule 57 ] ['39'] ==> ['49'] conf: 0.5265432098765432 support: 0.09675589836660617 lift: 1.0901843443568824  
 Rule 58 ] ['49'] ==> ['39'] conf: 0.20032879286049787 support: 0.09675589836660617 lift: 1.0901843443568824

Rule 59 ] ['39'] ==> ['33'] conf: 0.19197530864197532 support: 0.03527676950998185 lift: 1.065777280218926  
 Rule 60 ] ['33'] ==> ['39'] conf: 0.19584382871536524 support: 0.03527676950998185 lift: 1.065777280218926  
 Rule 61 ] ['39'] ==> ['287'] conf: 0.07654320987654321 support: 0.014065335753176044 lift: 5.313424710800039  
 Rule 62 ] ['287'] ==> ['39'] conf: 0.9763779527559056 support: 0.014065335753176044 lift: 5.31342471080004  
 Rule 63 ] ['66'] ==> ['40'] conf: 0.6283783783783784 support: 0.0316470054446461 lift: 1.090938122052734  
 Rule 64 ] ['40'] ==> ['66'] conf: 0.05494289090192989 support: 0.0316470054446461 lift: 1.090938122052734  
 Rule 65 ] ['42'] ==> ['49'] conf: 0.6095890410958904 support: 0.10095281306715063 lift: 1.2621270517382268  
 Rule 66 ] ['49'] ==> ['42'] conf: 0.20901831845937058 support: 0.10095281306715063 lift: 1.2621270517382266  
 Rule 67 ] ['33'] ==> ['40'] conf: 0.5453400503778337 support: 0.09823049001814882 lift: 0.946773903924967  
 Rule 68 ] ['40'] ==> ['33'] conf: 0.17053958251280033 support: 0.09823049001814882 lift: 0.9467739039249671  
 Rule 69 ] ['33'] ==> ['42'] conf: 0.20591939546599497 support: 0.03709165154264973 lift: 1.2434146509782271  
 Rule 70 ] ['42'] ==> ['33'] conf: 0.22397260273972602 support: 0.03709165154264973 lift: 1.2434146509782271  
 Rule 71 ] ['311'] ==> ['40'] conf: 0.7178423236514522 support: 0.019623411978221414 lift: 1.2462579608726276  
 Rule 72 ] ['311'] ==> ['49'] conf: 0.6556016597510373 support: 0.01792196007259528 lift: 1.3573941362999402  
 Rule 73 ] ['102'] ==> ['49'] conf: 0.5871559633027522 support: 0.014519056261343012 lift: 1.2156803599053696  
 Rule 74 ] ['33'] ==> ['49'] conf: 0.5321158690176322 support: 0.09584845735027223 lift: 1.1017222877546842  
 Rule 75 ] ['49'] ==> ['33'] conf: 0.19844997651479565 support: 0.09584845735027223 lift: 1.1017222877546842  
 Rule 76 ] ['66'] ==> ['49'] conf: 0.5720720720720721 support: 0.028811252268602542 lift: 1.184449832641472  
 Rule 77 ] ['49'] ==> ['66'] conf: 0.05965241897604509 support: 0.028811252268602542 lift: 1.1844498326414719  
 Rule 78 ] ['42'] ==> ['40'] conf: 0.7534246575342466 support: 0.12477313974591651 lift: 1.308033040729011  
 Rule 79 ] ['40'] ==> ['42'] conf: 0.21662071681764475 support: 0.12477313974591651 lift: 1.308033040729011  
 Rule 80 ] ['226'] ==> ['40'] conf: 0.7169230769230769 support: 0.026429219600725952 lift: 1.2446620413851608  
 Rule 81 ] ['226'] ==> ['49'] conf: 0.5076923076923078 support: 0.018715970961887478 lift: 1.0511543881201  
 Rule 82 ] ['49'] ==> ['40'] conf: 0.6921089713480507 support: 0.3342785843920145 lift: 1.201581861245454  
 Rule 83 ] ['40'] ==> ['49'] conf: 0.5803465931469083 support: 0.3342785843920145 lift: 1.201581861245454  
 Rule 84 ] ['476'] ==> ['40', '49'] conf: 0.47161572052401746 support: 0.012250453720508167 lift: 1.4108463495553911  
 Rule 85 ] ['40', '49'] ==> ['476'] conf: 0.07770614183915847 support: 0.012250453720508167 lift: 2.99151679674245  
 Rule 86 ] ['37'] ==> ['40', '49'] conf: 0.3779264214046823 support: 0.012817604355716878 lift: 1.1305732375648725  
 Rule 87 ] ['40', '49'] ==> ['37'] conf: 0.1014591109602986 support: 0.012817604355716878 lift: 2.99151679674245  
 Rule 88 ] ['37'] ==> ['49', '39'] conf: 0.44147157190635455 support: 0.014972776769509982 lift: 4.562735495810577  
 Rule 89 ] ['49', '39'] ==> ['37'] conf: 0.35052754982415 support: 0.014972776769509982 lift: 10.335287221570926  
 Rule 90 ] ['39'] ==> ['49', '37'] conf: 0.08148148148148149 support: 0.014972776769509982 lift: 5.243363071100298  
 Rule 91 ] ['49', '37'] ==> ['39'] conf: 11.824817518248175 support: 0.014972776769509982 lift: 64.35036496350365  
 Rule 92 ] ['39'] ==> ['171', '49'] conf: 0.10493827160493828 support: 0.01928312159709619 lift: 5.378696525983348  
 Rule 93 ] ['171', '49'] ==> ['39'] conf: 9.41860465116279 support: 0.01928312159709619 lift: 51.25581395348837  
 Rule 94 ] ['171'] ==> ['49', '39'] conf: 0.49562682215743437 support: 0.01928312159709619 lift: 5.122445561711538  
 Rule 95 ] ['49', '39'] ==> ['171'] conf: 0.40211019929660025 support: 0.01928312159709619 lift: 10.335287221570926  
 Rule 96 ] ['171'] ==> ['40', '49'] conf: 0.3760932944606414 support: 0.014632486388384755 lift: 1.1250894075212128  
 Rule 97 ] ['40', '49'] ==> ['171'] conf: 0.1163895486935867 support: 0.014632486388384755 lift: 2.9915167967424496  
 Rule 98 ] ['102'] ==> ['40', '49'] conf: 0.43577981651376146 support: 0.010775862068965518 lift: 1.3036426407822603  
 Rule 99 ] ['40', '49'] ==> ['102'] conf: 0.07397353240583644 support: 0.010775862068965518 lift: 2.9915167967424496  
 Rule 100 ] ['39'] ==> ['171', '40'] conf: 0.1314814814814815 support: 0.024160617059891108 lift: 5.341662399726917  
 Rule 101 ] ['171', '40'] ==> ['39'] conf: 7.465437788018432 support: 0.024160617059891108 lift: 40.626728110599075  
 Rule 102 ] ['171'] ==> ['40', '39'] conf: 0.6209912536443148 support: 0.024160617059891108 lift: 5.027234978997502

Rule 103 ] ['40', '39'] ==> ['171'] conf: 0.3149678604224059 support: 0.024160617059891108 lift: 8.095500459136822  
 Rule 104 ] ['238'] ==> ['40', '49'] conf: 0.4387755102040816 support: 0.014632486388384755 lift: 1.3126043087747483  
 Rule 105 ] ['40', '49'] ==> ['238'] conf: 0.0997624703087886 support: 0.014632486388384755 lift: 2.99151679674245  
 Rule 106 ] ['90'] ==> ['40', '49'] conf: 0.5445026178010473 support: 0.023593466424682397 lift: 1.6288887270220673  
 Rule 107 ] ['40', '49'] ==> ['90'] conf: 0.12962334577536477 support: 0.023593466424682397 lift: 2.99151679674245  
 Rule 108 ] ['66'] ==> ['40', '49'] conf: 0.41666666666666663 support: 0.02098457350272232 lift: 1.2464653319760206  
 Rule 109 ] ['40', '49'] ==> ['66'] conf: 0.1506616898540889 support: 0.02098457350272232 lift: 2.99151679674245  
 Rule 110 ] ['39'] ==> ['49', '42'] conf: 0.15370370370370373 support: 0.02824410163339383 lift: 1.5225301706200585  
 Rule 111 ] ['49', '42'] ==> ['39'] conf: 1.8202247191011234 support: 0.02824410163339383 lift: 9.90561797752809  
 Rule 112 ] ['42'] ==> ['49', '39'] conf: 0.17054794520547945 support: 0.02824410163339383 lift: 1.7626619987473702  
 Rule 113 ] ['49', '39'] ==> ['42'] conf: 1.7116060961313013 support: 0.02824410163339383 lift: 10.335287221570926  
 Rule 114 ] ['49'] ==> ['42', '39'] conf: 0.05847815875998121 support: 0.02824410163339383 lift: 1.305173285134163  
 Rule 115 ] ['42', '39'] ==> ['49'] conf: 10.779746835443039 support: 0.02824410163339383 lift: 22.318987341772154  
 Rule 116 ] ['39'] ==> ['40', '42'] conf: 0.19074074074074077 support: 0.03504990925589837 lift: 1.528700336700337  
 Rule 117 ] ['40', '42'] ==> ['39'] conf: 1.4727272727272727 support: 0.03504990925589837 lift: 8.014545454545456  
 Rule 118 ] ['42'] ==> ['40', '39'] conf: 0.21164383561643837 support: 0.03504990925589837 lift: 1.713362768406355  
 Rule 119 ] ['40', '39'] ==> ['42'] conf: 1.3406795224977044 support: 0.03504990925589837 lift: 8.095500459136822  
 Rule 120 ] ['40'] ==> ['42', '39'] conf: 0.060850728633320215 support: 0.03504990925589837 lift: 1.3581266421046863  
 Rule 121 ] ['42', '39'] ==> ['40'] conf: 12.855696202531645 support: 0.03504990925589837 lift: 22.318987341772154  
 Rule 122 ] ['37'] ==> ['40', '39'] conf: 0.6722408026755854 support: 0.0227994555353902 lift: 5.4421257267107075  
 Rule 123 ] ['40', '39'] ==> ['37'] conf: 0.27456382001836543 support: 0.0227994555353902 lift: 8.095500459136822  
 Rule 124 ] ['39'] ==> ['40', '37'] conf: 0.12407407407407409 support: 0.0227994555353902 lift: 5.1840617869053895  
 Rule 125 ] ['40', '37'] ==> ['39'] conf: 7.677725118483412 support: 0.0227994555353902 lift: 41.78199052132702  
 Rule 126 ] ['39'] ==> ['49', '111'] conf: 0.08827160493827162 support: 0.01622050816696915 lift: 5.330153898190429  
 Rule 127 ] ['49', '111'] ==> ['39'] conf: 11.095890410958903 support: 0.01622050816696915 lift: 60.38356164383561  
 Rule 128 ] ['111'] ==> ['49', '39'] conf: 0.5181159420289856 support: 0.01622050816696915 lift: 5.3548770749443575  
 Rule 129 ] ['49', '39'] ==> ['111'] conf: 0.32356389214536924 support: 0.01622050816696915 lift: 10.335287221570926  
 Rule 130 ] ['111'] ==> ['40', '49'] conf: 0.3804347826086957 support: 0.01191016333938294 lift: 1.1380770422389757  
 Rule 131 ] ['40', '49'] ==> ['111'] conf: 0.09365456396335255 support: 0.01191016333938294 lift: 2.9915167967424496  
 Rule 132 ] ['39'] ==> ['40', '111'] conf: 0.10432098765432099 support: 0.019169691470054446 lift: 5.378326474622771  
 Rule 133 ] ['40', '111'] ==> ['39'] conf: 9.473684210526315 support: 0.019169691470054446 lift: 51.55555555555556  
 Rule 134 ] ['111'] ==> ['40', '39'] conf: 0.6123188405797102 support: 0.019169691470054446 lift: 4.957027455051171  
 Rule 135 ] ['40', '39'] ==> ['111'] conf: 0.25344352617079885 support: 0.019169691470054446 lift: 8.095500459136822  
 Rule 136 ] ['39'] ==> ['42', '33'] conf: 0.05987654320987655 support: 0.011002722323049002 lift: 1.6142862536338585  
 Rule 137 ] ['42', '33'] ==> ['39'] conf: 4.954128440366972 support: 0.011002722323049002 lift: 26.960244648318042  
 Rule 138 ] ['33'] ==> ['42', '39'] conf: 0.0610831234256927 support: 0.011002722323049002 lift: 1.3633134585339415  
 Rule 139 ] ['42', '39'] ==> ['33'] conf: 4.020253164556962 support: 0.011002722323049002 lift: 22.318987341772154  
 Rule 140 ] ['42'] ==> ['33', '39'] conf: 0.06643835616438357 support: 0.011002722323049002 lift: 1.8833458133286354  
 Rule 141 ] ['33', '39'] ==> ['42'] conf: 4.694533762057878 support: 0.011002722323049002 lift: 28.34726688102894  
 Rule 142 ] ['39'] ==> ['49', '33'] conf: 0.12037037037037038 support: 0.022118874773139747 lift: 1.255840455840456  
 Rule 143 ] ['49', '33'] ==> ['39'] conf: 1.9171597633136095 support: 0.022118874773139747 lift: 10.433136094674557  
 Rule 144 ] ['33'] ==> ['49', '39'] conf: 0.12279596977329976 support: 0.022118874773139747 lift: 1.2691316172583949  
 Rule 145 ] ['49', '39'] ==> ['33'] conf: 1.8616647127784292 support: 0.022118874773139747 lift: 10.335287221570926  
 Rule 146 ] ['39'] ==> ['40', '49'] conf: 0.40925925925925927 support: 0.07520417422867513 lift: 1.2243059482964471

Rule 147 ] ['40', '49'] ==> ['39'] conf: 0.5497115710892433 support: 0.07520417422867513 lift: 2.99151679674245  
 Rule 148 ] ['49'] ==> ['40', '39'] conf: 0.15570690465007045 support: 0.07520417422867513 lift: 1.2605253180854188  
 Rule 149 ] ['40', '39'] ==> ['49'] conf: 3.9100091827364554 support: 0.07520417422867513 lift: 8.095500459136822  
 Rule 150 ] ['40'] ==> ['49', '39'] conf: 0.13056321386372588 support: 0.07520417422867513 lift: 1.3494083158529981  
 Rule 151 ] ['49', '39'] ==> ['40'] conf: 5.953106682297772 support: 0.07520417422867513 lift: 10.335287221570926  
 Rule 152 ] ['39'] ==> ['40', '33'] conf: 0.1314814814814815 support: 0.024160617059891108 lift: 1.3384997006244121  
 Rule 153 ] ['40', '33'] ==> ['39'] conf: 1.8706697459584294 support: 0.024160617059891108 lift: 10.18013856812933  
 Rule 154 ] ['33'] ==> ['40', '39'] conf: 0.1341309823677582 support: 0.024160617059891108 lift: 1.0858574293426595  
 Rule 155 ] ['40', '39'] ==> ['33'] conf: 1.45821854912764 support: 0.024160617059891108 lift: 8.095500459136822  
 Rule 156 ] ['39'] ==> ['40', '287'] conf: 0.0555555555555556 support: 0.010208711433756805 lift: 5.382173382173383  
 Rule 157 ] ['40', '287'] ==> ['39'] conf: 17.8021978021978 support: 0.010208711433756805 lift: 96.87912087912088  
 Rule 158 ] ['287'] ==> ['40', '39'] conf: 0.7086614173228346 support: 0.010208711433756805 lift: 5.736968829309559  
 Rule 159 ] ['40', '39'] ==> ['287'] conf: 0.11662075298438936 support: 0.010208711433756805 lift: 8.095500459136822  
 Rule 160 ] ['42'] ==> ['40', '49'] conf: 0.4931506849315068 support: 0.08166969147005444 lift: 1.4752685572976465  
 Rule 161 ] ['40', '49'] ==> ['42'] conf: 0.49541907024092297 support: 0.08166969147005444 lift: 2.9915167967424496  
 Rule 162 ] ['49'] ==> ['40', '42'] conf: 0.16909347111319867 support: 0.08166969147005444 lift: 1.3552073103035995  
 Rule 163 ] ['40', '42'] ==> ['49'] conf: 3.870909090909091 support: 0.08166969147005444 lift: 8.014545454545456  
 Rule 164 ] ['40'] ==> ['49', '42'] conf: 0.14178810555336746 support: 0.08166969147005444 lift: 1.4044988073690872  
 Rule 165 ] ['49', '42'] ==> ['40'] conf: 5.70561797752809 support: 0.08166969147005444 lift: 9.90561797752809  
 Rule 166 ] ['311'] ==> ['40', '49'] conf: 0.5103734439834025 support: 0.013951905626134301 lift: 1.5267907302876402  
 Rule 167 ] ['40', '49'] ==> ['311'] conf: 0.08177807940278249 support: 0.013951905626134301 lift: 2.99151679674245  
 Rule 168 ] ['33'] ==> ['40', '49'] conf: 0.35012594458438284 support: 0.06306715063520871 lift: 1.0474076441994975  
 Rule 169 ] ['40', '49'] ==> ['33'] conf: 0.5388530709195792 support: 0.06306715063520871 lift: 2.99151679674245  
 Rule 170 ] ['49'] ==> ['40', '33'] conf: 0.13057773602630343 support: 0.06306715063520871 lift: 1.3292994466603822  
 Rule 171 ] ['40', '33'] ==> ['49'] conf: 4.916859122401847 support: 0.06306715063520871 lift: 10.18013856812933  
 Rule 172 ] ['40'] ==> ['49', '33'] conf: 0.10949192595510043 support: 0.06306715063520871 lift: 1.1423441647575923  
 Rule 173 ] ['49', '33'] ==> ['40'] conf: 6.0094674556213015 support: 0.06306715063520871 lift: 10.433136094674555  
 Rule 174 ] ['33'] ==> ['40', '42'] conf: 0.14924433249370278 support: 0.026882940108892923 lift: 1.196125486604076  
 Rule 175 ] ['40', '42'] ==> ['33'] conf: 1.4436363636363636 support: 0.026882940108892923 lift: 8.014545454545454  
 Rule 176 ] ['42'] ==> ['40', '33'] conf: 0.16232876712328767 support: 0.026882940108892923 lift: 1.6525293429086652  
 Rule 177 ] ['40', '33'] ==> ['42'] conf: 1.6859122401847575 support: 0.026882940108892923 lift: 10.18013856812933  
 Rule 178 ] ['33'] ==> ['49', '42'] conf: 0.13098236775818642 support: 0.023593466424682397 lift: 1.297461296804687  
 Rule 179 ] ['49', '42'] ==> ['33'] conf: 1.7842696629213484 support: 0.023593466424682397 lift: 9.90561797752809  
 Rule 180 ] ['42'] ==> ['49', '33'] conf: 0.14246575342465753 support: 0.023593466424682397 lift: 1.4863645943097998  
 Rule 181 ] ['49', '33'] ==> ['42'] conf: 1.7278106508875741 support: 0.023593466424682397 lift: 10.433136094674557  
 Rule 182 ] ['226'] ==> ['40', '49'] conf: 0.4123076923076923 support: 0.015199637023593466 lift: 1.2334253869645795  
 Rule 183 ] ['40', '49'] ==> ['226'] conf: 0.11028164234815066 support: 0.015199637023593466 lift: 2.99151679674245  
 Rule 184 ] ['37', '39'] ==> ['40', '49'] conf: 0.38028169014084506 support: 0.012250453720508167 lift: 1.1376190635499457  
 Rule 185 ] ['40', '37'] ==> ['49', '39'] conf: 0.5118483412322274 support: 0.012250453720508167 lift: 5.290099620519715  
 Rule 186 ] ['40', '39'] ==> ['49', '37'] conf: 0.09917355371900827 support: 0.012250453720508167 lift: 6.381854376545816  
 Rule 187 ] ['49', '37'] ==> ['40', '39'] conf: 0.7883211678832117 support: 0.012250453720508167 lift: 6.381854376545816  
 Rule 188 ] ['49', '39'] ==> ['40', '37'] conf: 0.12661195779601406 support: 0.012250453720508167 lift: 5.290099620519715  
 Rule 189 ] ['37'] ==> ['40', '49', '39'] conf: 0.36120401337792646 support: 0.012250453720508167 lift: 4.802978253302865  
 Rule 190 ] ['40', '49', '39'] ==> ['37'] conf: 0.4509803921568627 support: 0.012250453720508167 lift: 13.29713423831071

Rule 191 ] ['39'] ==> ['40', '49', '37'] conf: 0.06666666666666667 support: 0.012250453720508167 lift: 5.20117994100295  
Rule 192 ] ['40', '49', '37'] ==> ['39'] conf: 14.336283185840708 support: 0.012250453720508167 lift: 78.01769911504425  
Rule 193 ] ['171', '39'] ==> ['40', '49'] conf: 0.382089552238806 support: 0.014519056261343012 lift: 1.1430273133821898  
Rule 194 ] ['40', '39'] ==> ['171', '49'] conf: 0.11753902662993572 support: 0.014519056261343012 lift: 6.0245584812181  
Rule 195 ] ['40', '171'] ==> ['49', '39'] conf: 0.5898617511520737 support: 0.014519056261343012 lift: 6.0963906191754775  
Rule 196 ] ['49', '39'] ==> ['40', '171'] conf: 0.15005861664712777 support: 0.014519056261343012 lift: 6.096390619175477  
Rule 197 ] ['171', '49'] ==> ['40', '39'] conf: 0.7441860465116278 support: 0.014519056261343012 lift: 6.0245584812181  
Rule 198 ] ['39'] ==> ['40', '49', '171'] conf: 0.07901234567901234 support: 0.014519056261343012 lift: 5.399789453536224  
Rule 199 ] ['40', '49', '171'] ==> ['39'] conf: 12.55813953488372 support: 0.014519056261343012 lift: 68.34108527131782  
Rule 200 ] ['171'] ==> ['40', '49', '39'] conf: 0.37317784256559766 support: 0.014519056261343012 lift: 4.9621958673579325  
Rule 201 ] ['40', '49', '39'] ==> ['171'] conf: 0.5173453996983409 support: 0.014519056261343012 lift: 13.29713423831071  
Rule 202 ] ['40', '39'] ==> ['49', '42'] conf: 0.1919191919191919 support: 0.023706896551724137 lift: 1.9010781977074112  
Rule 203 ] ['42', '39'] ==> ['40', '49'] conf: 0.529113924050633 support: 0.023706896551724137 lift: 1.5828531911877775  
Rule 204 ] ['40', '42'] ==> ['49', '39'] conf: 0.19 support: 0.023706896551724137 lift: 1.963704572098476  
Rule 205 ] ['49', '39'] ==> ['40', '42'] conf: 0.24501758499413834 support: 0.023706896551724137 lift: 1.963704572098476  
Rule 206 ] ['40', '49'] ==> ['42', '39'] conf: 0.07091957923311842 support: 0.023706896551724137 lift: 1.5828531911877775  
Rule 207 ] ['49', '42'] ==> ['40', '39'] conf: 0.2348314606741573 support: 0.023706896551724137 lift: 1.9010781977074112  
Rule 208 ] ['39'] ==> ['40', '49', '42'] conf: 0.12901234567901235 support: 0.023706896551724137 lift: 1.579684499314129  
Rule 209 ] ['40', '49', '42'] ==> ['39'] conf: 2.25 support: 0.023706896551724137 lift: 12.244444444444445  
Rule 210 ] ['42'] ==> ['40', '49', '39'] conf: 0.14315068493150684 support: 0.023706896551724137 lift: 1.9034938738403686  
Rule 211 ] ['40', '49', '39'] ==> ['42'] conf: 2.20211161387632 support: 0.023706896551724137 lift: 13.29713423831071  
Rule 212 ] ['111', '39'] ==> ['40', '49'] conf: 0.3947368421052631 support: 0.01191016333938294 lift: 1.180861893450967  
Rule 213 ] ['40', '39'] ==> ['49', '111'] conf: 0.09641873278236915 support: 0.01191016333938294 lift: 5.822106494584702  
Rule 214 ] ['40', '111'] ==> ['49', '39'] conf: 0.6140350877192982 support: 0.01191016333938294 lift: 6.346228995701445  
Rule 215 ] ['49', '39'] ==> ['40', '111'] conf: 0.123094958968347 support: 0.01191016333938294 lift: 6.346228995701446  
Rule 216 ] ['49', '111'] ==> ['40', '39'] conf: 0.7191780821917808 support: 0.01191016333938294 lift: 5.822106494584701  
Rule 217 ] ['39'] ==> ['40', '49', '111'] conf: 0.06481481481481481 support: 0.01191016333938294 lift: 5.441975308641975  
Rule 218 ] ['40', '49', '111'] ==> ['39'] conf: 15.428571428571427 support: 0.01191016333938294 lift: 83.96190476190476  
Rule 219 ] ['111'] ==> ['40', '49', '39'] conf: 0.3804347826086957 support: 0.01191016333938294 lift: 5.058692373270379  
Rule 220 ] ['40', '49', '39'] ==> ['111'] conf: 0.41628959276018096 support: 0.01191016333938294 lift: 13.29713423831071  
Rule 221 ] ['40', '39'] ==> ['49', '33'] conf: 0.13957759412304865 support: 0.017241379310344827 lift: 1.4562320352530143  
Rule 222 ] ['33', '39'] ==> ['40', '49'] conf: 0.48874598070739556 support: 0.017241379310344827 lift: 1.4620918106265353  
Rule 223 ] ['40', '33'] ==> ['49', '39'] conf: 0.17551963048498845 support: 0.017241379310344827 lift: 1.814045794086352  
Rule 224 ] ['49', '39'] ==> ['40', '33'] conf: 0.17819460726846426 support: 0.017241379310344827 lift: 1.8140457940863521  
Rule 225 ] ['40', '49'] ==> ['33', '39'] conf: 0.05157787580590431 support: 0.017241379310344827 lift: 1.4620918106265353  
Rule 226 ] ['49', '33'] ==> ['40', '39'] conf: 0.17988165680473372 support: 0.017241379310344827 lift: 1.4562320352530143  
Rule 227 ] ['39'] ==> ['40', '49', '33'] conf: 0.09382716049382717 support: 0.017241379310344827 lift: 1.4877342570388137  
Rule 228 ] ['40', '49', '33'] ==> ['39'] conf: 2.9136690647482015 support: 0.017241379310344827 lift: 15.85611510791367  
Rule 229 ] ['33'] ==> ['40', '49', '39'] conf: 0.09571788413098237 support: 0.017241379310344827 lift: 1.2727735542967429  
Rule 230 ] ['40', '49', '39'] ==> ['33'] conf: 2.3951734539969833 support: 0.017241379310344827 lift: 13.29713423831071  
Rule 231 ] ['40', '33'] ==> ['49', '42'] conf: 0.19168591224018477 support: 0.01882940108892922 lift: 1.898767418325246  
Rule 232 ] ['40', '42'] ==> ['49', '33'] conf: 0.1509090909090909 support: 0.01882940108892922 lift: 1.5744550833781603  
Rule 233 ] ['42', '33'] ==> ['40', '49'] conf: 0.5076452599388379 support: 0.01882940108892922 lift: 1.5186293218937208  
Rule 234 ] ['40', '49'] ==> ['42', '33'] conf: 0.05632846963013234 support: 0.01882940108892922 lift: 1.5186293218937208



Rule 235 ] ['49', '33'] ==>> ['40', '42'] conf: 0.19644970414201185 support: 0.01882940108892922 lift: 1.5744550833781605  
 Rule 236 ] ['49', '42'] ==>> ['40', '33'] conf: 0.18651685393258427 support: 0.01882940108892922 lift: 1.8987674183252459  
 Rule 237 ] ['33'] ==>> ['40', '49', '42'] conf: 0.10453400503778339 support: 0.01882940108892922 lift: 1.2799608172404144  
 Rule 238 ] ['40', '49', '42'] ==>> ['33'] conf: 2.2055555555555557 support: 0.01882940108892922 lift: 12.244444444444445  
 Rule 239 ] ['42'] ==>> ['40', '49', '33'] conf: 0.1136986301369863 support: 0.01882940108892922 lift: 1.802818567064157  
 Rule 240 ] ['40', '49', '33'] ==>> ['42'] conf: 2.6258992805755397 support: 0.01882940108892922 lift: 15.85611510791367  
 -----FOR 0.01 MIN SUPPORT threshold-----  
 -----FOR 0.2 SAMPLE DATA-----

Frequent set:

[['13042'], ['605'], ['287'], ['16011'], ['593'], ['202'], ['50'], ['118'], ['77'], ['38'], ['1005'], ['534'], ['250'], ['590'], ['124'], ['439'], ['549'],  
 ], ['15833'], ['773'], ['20'], ['66'], ['61'], ['523'], ['406'], ['226'], ['265'], ['259'], ['111'], ['1328'], ['180'], ['476'], ['271'], ['825'], ['3271'],  
 ], ['186'], ['32'], ['414'], ['90'], ['480'], ['339'], ['14099'], ['741'], ['102'], ['46'], ['272'], ['16218'], ['79'], ['162'], ['1147'], ['37'], ['311'],  
 ], ['176'], ['148'], ['238'], ['650'], ['1394'], ['12926'], ['10516'], ['2239'], ['302'], ['2959'], ['678'], ['256'], ['33'], ['80'], ['49'], ['39'], ['171'],  
 ], ['10'], ['42'], ['40']] -----Length: 71

[['49', '1328'], ['49', '311'], ['271', '49'], ['124', '49'], ['49', '439'], ['49', '102'], ['40', '534'], ['476', '40'], ['476', '49'], ['287', '39'], ['42',  
 '66'], ['40', '66'], ['49', '66'], ['38', '39'], ['238', '49'], ['40', '439'], ['271', '40'], ['49', '148'], ['40', '226'], ['49', '226'], ['61', '40'], ['61', '49'],  
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 '49'], ['49', '90'], ['40', '102'], ['49', '12926'], ['40', '272'], ['49', '272'], ['40', '1147'], ['40', '148'], ['40', '311'], ['40', '37'], ['39', '37'], ['238',  
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[['40', '49', '311'], ['476', '49', '40'], ['40', '49', '66'], ['238', '49', '40'], ['49', '33', '39'], ['40', '42', '33'], ['40', '33', '39'], ['40', '49', '226'],  
 ], ['40', '49', '414'], ['49', '111', '39'], ['40', '49', '111'], ['40', '111', '39'], ['40', '49', '37'], ['49', '39', '37'], ['40', '49', '90'], ['40', '49', '33'],  
 ], ['49', '42', '33'], ['40', '39', '37'], ['49', '42', '39'], ['40', '49', '42'], ['171', '49', '39'], ['40', '42', '39'], ['40', '49', '39'], ['171', '49', '40'], ['171',  
 '39', '40']] -----Length: 25

[['49', '33', '40', '39'], ['49', '33', '42', '40'], ['49', '40', '111', '39'], ['49', '40', '39', '37'], ['49', '40', '171', '39'], ['49', '42', '40', '39']] -----  
 Length: 6

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**Execution Time: 0:00:50.454045**

**No of Candidate sets: 15130**

**No of frequent sets: 163**

Rule 1 ] ['1328'] ==>> ['49'] conf: 0.5640243902439024 support: 0.01049228675136116 lift: 1.1815228761768428  
 Rule 2 ] ['311'] ==>> ['49'] conf: 0.6372360844529751 support: 0.01882940108892922 lift: 1.3348873281543134  
 Rule 3 ] ['271'] ==>> ['49'] conf: 0.5229885057471265 support: 0.010322141560798548 lift: 1.0955605718585404  
 Rule 4 ] ['124'] ==>> ['49'] conf: 0.6133333333333334 support: 0.010435571687840291 lift: 1.2848156508653124  
 Rule 5 ] ['439'] ==>> ['49'] conf: 0.5488126649076517 support: 0.011796733212341199 lift: 1.1496572303257353  
 Rule 6 ] ['102'] ==>> ['49'] conf: 0.5700712589073634 support: 0.013611615245009074 lift: 1.1941899057924001  
 Rule 7 ] ['534'] ==>> ['40'] conf: 0.6578947368421053 support: 0.011343012704174229 lift: 1.1450004935346956  
 Rule 8 ] ['476'] ==>> ['40'] conf: 0.7115384615384616 support: 0.01678765880217786 lift: 1.2383620722382938  
 Rule 9 ] ['476'] ==>> ['49'] conf: 0.6802884615384616 support: 0.016050362976406534 lift: 1.4250737975342942  
 Rule 10 ] ['39'] ==>> ['287'] conf: 0.07702060221870048 support: 0.013781760435571689 lift: 5.3255970914514785  
 Rule 11 ] ['287'] ==>> ['39'] conf: 0.9529411764705883 support: 0.013781760435571689 lift: 5.325597091451478  
 Rule 12 ] ['66'] ==>> ['42'] conf: 0.21349557522123894 support: 0.01094600725952813 lift: 1.2760521973901306  
 Rule 13 ] ['42'] ==>> ['66'] conf: 0.06542372881355932 support: 0.01094600725952813 lift: 1.2760521973901304  
 Rule 14 ] ['66'] ==>> ['40'] conf: 0.629424778761062 support: 0.03227087114337568 lift: 1.0954513571330613

Rule 15 ] ['40'] ==> ['66'] conf: 0.056164248346658764 support: 0.03227087114337568 lift: 1.0954513571330613  
 Rule 16 ] ['66'] ==> ['49'] conf: 0.5619469026548674 support: 0.028811252268602542 lift: 1.1771709382928146  
 Rule 17 ] ['49'] ==> ['66'] conf: 0.060354045384341214 support: 0.028811252268602542 lift: 1.1771709382928146  
 Rule 18 ] ['39'] ==> ['38'] conf: 0.0716323296354992 support: 0.012817604355716878 lift: 5.420692000571339  
 Rule 19 ] ['38'] ==> ['39'] conf: 0.9699570815450643 support: 0.012817604355716878 lift: 5.420692000571338  
 Rule 20 ] ['238'] ==> ['49'] conf: 0.5646481178396073 support: 0.019566696914700546 lift: 1.1828294658129923  
 Rule 21 ] ['439'] ==> ['40'] conf: 0.6754617414248021 support: 0.014519056261343012 lift: 1.175574121488709  
 Rule 22 ] ['271'] ==> ['40'] conf: 0.6695402298850575 support: 0.013214609800362976 lift: 1.1652683183627808  
 Rule 23 ] ['148'] ==> ['49'] conf: 0.5738161559888579 support: 0.011683303085299456 lift: 1.202034746631287  
 Rule 24 ] ['226'] ==> ['40'] conf: 0.7069243156199678 support: 0.024897912885662433 lift: 1.2303316092203407  
 Rule 25 ] ['226'] ==> ['49'] conf: 0.5249597423510467 support: 0.018489110707803992 lift: 1.0996899343155109  
 Rule 26 ] ['61'] ==> ['40'] conf: 0.6818181818181818 support: 0.01191016333938294 lift: 1.1866368751177752  
 Rule 27 ] ['61'] ==> ['49'] conf: 0.577922077922078 support: 0.010095281306715064 lift: 1.2106358652634048  
 Rule 28 ] ['414'] ==> ['40'] conf: 0.6325 support: 0.0143489110707804 lift: 1.100803474484256  
 Rule 29 ] ['111'] ==> ['40'] conf: 0.6424682395644283 support: 0.020077132486388385 lift: 1.1181522061000888  
 Rule 30 ] ['39'] ==> ['111'] conf: 0.17020602218700476 support: 0.030455989110707803 lift: 5.446592709984152  
 Rule 31 ] ['111'] ==> ['39'] conf: 0.9745916515426497 support: 0.030455989110707803 lift: 5.446592709984152  
 Rule 32 ] ['111'] ==> ['49'] conf: 0.5372050816696915 support: 0.01678765880217786 lift: 1.125341570630866  
 Rule 33 ] ['1328'] ==> ['40'] conf: 0.6280487804878049 support: 0.011683303085299456 lift: 1.0930565687060483  
 Rule 34 ] ['39'] ==> ['33'] conf: 0.1768621236133122 support: 0.0316470054446461 lift: 1.0560219991703084  
 Rule 35 ] ['33'] ==> ['39'] conf: 0.18896037927531323 support: 0.0316470054446461 lift: 1.0560219991703084  
 Rule 36 ] ['37'] ==> ['49'] conf: 0.48722316865417387 support: 0.01622050816696915 lift: 1.0206390530724003  
 Rule 37 ] ['90'] ==> ['40'] conf: 0.7128834355828221 support: 0.032951451905626136 lift: 1.2407028660740615  
 Rule 38 ] ['40'] ==> ['90'] conf: 0.05734873161583259 support: 0.032951451905626136 lift: 1.2407028660740615  
 Rule 39 ] ['414'] ==> ['49'] conf: 0.6025 support: 0.013668330308529946 lift: 1.2621218961625282  
 Rule 40 ] ['33'] ==> ['42'] conf: 0.21063325431764304 support: 0.03527676950998185 lift: 1.2589442508910786  
 Rule 41 ] ['42'] ==> ['33'] conf: 0.21084745762711862 support: 0.03527676950998185 lift: 1.2589442508910786  
 Rule 42 ] ['2239'] ==> ['49'] conf: 0.5632183908045978 support: 0.011116152450090745 lift: 1.179834462001505  
 Rule 43 ] ['90'] ==> ['49'] conf: 0.70920245398773 support: 0.03278130671506352 lift: 1.485643063884003  
 Rule 44 ] ['49'] ==> ['90'] conf: 0.06867054770108114 support: 0.03278130671506352 lift: 1.485643063884003  
 Rule 45 ] ['102'] ==> ['40'] conf: 0.6104513064133017 support: 0.014575771324863884 lift: 1.0624299116256377  
 Rule 46 ] ['12926'] ==> ['49'] conf: 0.5894039735099338 support: 0.010095281306715064 lift: 1.2346882334474458  
 Rule 47 ] ['272'] ==> ['40'] conf: 0.6914153132250581 support: 0.016901088929219602 lift: 1.2033397298178092  
 Rule 48 ] ['272'] ==> ['49'] conf: 0.4988399071925754 support: 0.012193738656987295 lift: 1.0449738913650337  
 Rule 49 ] ['1147'] ==> ['40'] conf: 0.7153846153846153 support: 0.010549001814882032 lift: 1.2450559212774195  
 Rule 50 ] ['148'] ==> ['40'] conf: 0.6350974930362118 support: 0.01293103448275862 lift: 1.1053241533130476  
 Rule 51 ] ['311'] ==> ['40'] conf: 0.7024952015355086 support: 0.02075771324863884 lift: 1.2226231757451473  
 Rule 52 ] ['37'] ==> ['40'] conf: 0.68824531516184 support: 0.022912885662431944 lift: 1.1978226628105382  
 Rule 53 ] ['37'] ==> ['39'] conf: 0.959114139693356 support: 0.03193058076225045 lift: 5.360095249151586  
 Rule 54 ] ['39'] ==> ['37'] conf: 0.1784469096671949 support: 0.03193058076225045 lift: 5.360095249151586  
 Rule 55 ] ['238'] ==> ['40'] conf: 0.6546644844517185 support: 0.022686025408348458 lift: 1.1393785598512192  
 Rule 56 ] ['2239'] ==> ['40'] conf: 0.7557471264367817 support: 0.01491606170598911 lift: 1.3153028657914652  
 Rule 57 ] ['12926'] ==> ['40'] conf: 0.6721854304635762 support: 0.011513157894736841 lift: 1.1698720274339922  
 Rule 58 ] ['256'] ==> ['40'] conf: 0.7482993197278911 support: 0.01247731397459165 lift: 1.3023406974081706

Rule 59 ] ['256'] ==> ['49'] conf: 0.7142857142857143 support: 0.01191016333938294 lift: 1.4962915188648822  
 Rule 60 ] ['33'] ==> ['40'] conf: 0.5509651202167287 support: 0.09227540834845735 lift: 0.9589001085442069  
 Rule 61 ] ['40'] ==> ['33'] conf: 0.16059618991215083 support: 0.09227540834845735 lift: 0.9589001085442069  
 Rule 62 ] ['33'] ==> ['49'] conf: 0.5174398916356248 support: 0.0866606170598911 lift: 1.0839372899274486  
 Rule 63 ] ['49'] ==> ['33'] conf: 0.18153736485683733 support: 0.0866606170598911 lift: 1.0839372899274486  
 Rule 64 ] ['171'] ==> ['40'] conf: 0.6286594761171032 support: 0.023139745916515426 lift: 1.0941194238374061  
 Rule 65 ] ['39'] ==> ['40'] conf: 0.6545166402535657 support: 0.11711660617059891 lift: 1.1391212516978453  
 Rule 66 ] ['40'] ==> ['39'] conf: 0.20382982923699536 support: 0.11711660617059891 lift: 1.1391212516978453  
 Rule 67 ] ['39'] ==> ['42'] conf: 0.24152139461172742 support: 0.043216878402903815 lift: 1.4435610948454163  
 Rule 68 ] ['42'] ==> ['39'] conf: 0.25830508474576275 support: 0.043216878402903815 lift: 1.4435610948454163  
 Rule 69 ] ['39'] ==> ['171'] conf: 0.20158478605388272 support: 0.03607078039927405 lift: 5.476645528046317  
 Rule 70 ] ['171'] ==> ['39'] conf: 0.9799691833590138 support: 0.03607078039927405 lift: 5.476645528046317  
 Rule 71 ] ['49'] ==> ['40'] conf: 0.688844006177973 support: 0.32883393829401086 lift: 1.1988646251041377  
 Rule 72 ] ['40'] ==> ['49'] conf: 0.5723028328891521 support: 0.32883393829401086 lift: 1.198864625104138  
 Rule 73 ] ['42'] ==> ['49'] conf: 0.6159322033898306 support: 0.10305127041742287 lift: 1.2902597849791484  
 Rule 74 ] ['49'] ==> ['42'] conf: 0.21587263870737794 support: 0.10305127041742287 lift: 1.2902597849791484  
 Rule 75 ] ['171'] ==> ['49'] conf: 0.49768875192604 support: 0.018318965517241378 lift: 1.0425624419579347  
 Rule 76 ] ['39'] ==> ['49'] conf: 0.5185419968304279 support: 0.09278584392014519 lift: 1.086245988845682  
 Rule 77 ] ['49'] ==> ['39'] conf: 0.1943685398598075 support: 0.09278584392014519 lift: 1.0862459888456817  
 Rule 78 ] ['80'] ==> ['40'] conf: 0.7080745341614906 support: 0.01293103448275862 lift: 1.2323334504328696  
 Rule 79 ] ['80'] ==> ['49'] conf: 0.6055900621118012 support: 0.011059437386569873 lift: 1.2685949833854435  
 Rule 80 ] ['42'] ==> ['40'] conf: 0.7783050847457629 support: 0.13021778584392016 lift: 1.3545627533547815  
 Rule 81 ] ['40'] ==> ['42'] conf: 0.22663113216859146 support: 0.13021778584392016 lift: 1.3545627533547813  
 Rule 82 ] ['311'] ==> ['40', '49'] conf: 0.510556621880998 support: 0.015086206896551725 lift: 1.552627519317999  
 Rule 83 ] ['40', '49'] ==> ['311'] conf: 0.0898585719213522 support: 0.015086206896551725 lift: 3.0410486374611936  
 Rule 84 ] ['476'] ==> ['40', '49'] conf: 0.5288461538461537 support: 0.01247731397459165 lift: 1.6082468755804387  
 Rule 85 ] ['40', '49'] ==> ['476'] conf: 0.07174887892376683 support: 0.01247731397459165 lift: 3.041048637461194  
 Rule 86 ] ['66'] ==> ['40', '49'] conf: 0.3949115044247788 support: 0.020247277676951 lift: 1.2009450924487237  
 Rule 87 ] ['40', '49'] ==> ['66'] conf: 0.1559158330458779 support: 0.020247277676951 lift: 3.0410486374611936  
 Rule 88 ] ['238'] ==> ['40', '49'] conf: 0.4206219312602292 support: 0.014575771324863884 lift: 1.2791317509452158  
 Rule 89 ] ['40', '49'] ==> ['238'] conf: 0.10538116591928251 support: 0.014575771324863884 lift: 3.0410486374611936  
 Rule 90 ] ['39'] ==> ['49', '33'] conf: 0.101743264659271 support: 0.01820553539019964 lift: 1.1740426979530538  
 Rule 91 ] ['49', '33'] ==> ['39'] conf: 2.0647905759162306 support: 0.01820553539019964 lift: 11.539267015706807  
 Rule 92 ] ['33'] ==> ['49', '39'] conf: 0.10870301388418557 support: 0.01820553539019964 lift: 1.1715473965806602  
 Rule 93 ] ['49', '39'] ==> ['33'] conf: 1.8050122249388754 support: 0.01820553539019964 lift: 10.777506112469437  
 Rule 94 ] ['33'] ==> ['40', '42'] conf: 0.15204876396884523 support: 0.025465063520871144 lift: 1.1676497414192852  
 Rule 95 ] ['40', '42'] ==> ['33'] conf: 1.286149825783972 support: 0.025465063520871144 lift: 7.6794425087108005  
 Rule 96 ] ['42'] ==> ['40', '33'] conf: 0.1522033898305085 support: 0.025465063520871144 lift: 1.6494469388392905  
 Rule 97 ] ['40', '33'] ==> ['42'] conf: 1.8131530424093423 support: 0.025465063520871144 lift: 10.837123540258144  
 Rule 98 ] ['39'] ==> ['40', '33'] conf: 0.11188589540412044 support: 0.020020417422867514 lift: 1.2125212709068542  
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 Rule 101 ] ['40', '39'] ==> ['33'] conf: 1.4300242130750607 support: 0.020020417422867514 lift: 8.538498789346248  
 Rule 102 ] ['226'] ==> ['40', '49'] conf: 0.4219001610305958 support: 0.014859346642468239 lift: 1.2830189098467515

Rule 103 ] ['40', '49'] ==> ['226'] conf: 0.10710589858571923 support: 0.014859346642468239 lift: 3.041048637461194  
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 Rule 105 ] ['40', '49'] ==> ['414'] conf: 0.0689893066574681 support: 0.010151996370235934 lift: 3.0410486374611936  
 Rule 106 ] ['39'] ==> ['49', '111'] conf: 0.09381933438985737 support: 0.01678765880217786 lift: 5.588589540412045  
 Rule 107 ] ['49', '111'] ==> ['39'] conf: 10.658783783783784 support: 0.01678765880217786 lift: 59.567567567567565  
 Rule 108 ] ['111'] ==> ['49', '39'] conf: 0.5372050816696915 support: 0.01678765880217786 lift: 5.789731051344743  
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 Rule 110 ] ['111'] ==> ['40', '49'] conf: 0.3938294010889292 support: 0.012307168784029038 lift: 1.197654363573646  
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 Rule 112 ] ['39'] ==> ['40', '111'] conf: 0.11125198098256735 support: 0.01990698729582577 lift: 5.541228612103467  
 Rule 113 ] ['40', '111'] ==> ['39'] conf: 8.912429378531073 support: 0.01990698729582577 lift: 49.807909604519764  
 Rule 114 ] ['111'] ==> ['40', '39'] conf: 0.6370235934664247 support: 0.01990698729582577 lift: 5.439225181598063  
 Rule 115 ] ['40', '39'] ==> ['111'] conf: 0.26682808716707024 support: 0.01990698729582577 lift: 8.538498789346248  
 Rule 116 ] ['37'] ==> ['40', '49'] conf: 0.38671209540034074 support: 0.012874319419237749 lift: 1.1760102908069694  
 Rule 117 ] ['40', '49'] ==> ['37'] conf: 0.10124180751983443 support: 0.012874319419237749 lift: 3.041048637461194  
 Rule 118 ] ['37'] ==> ['49', '39'] conf: 0.4718909710391823 support: 0.015710072595281305 lift: 5.085807824793926  
 Rule 119 ] ['49', '39'] ==> ['37'] conf: 0.35880195599022 support: 0.015710072595281305 lift: 10.777506112469437  
 Rule 120 ] ['39'] ==> ['49', '37'] conf: 0.087797147385103 support: 0.015710072595281305 lift: 5.412724834594881  
 Rule 121 ] ['49', '37'] ==> ['39'] conf: 11.031468531468532 support: 0.015710072595281305 lift: 61.650349650349646  
 Rule 122 ] ['90'] ==> ['40', '49'] conf: 0.5423312883435583 support: 0.025068058076225044 lift: 1.6492558254697516  
 Rule 123 ] ['40', '49'] ==> ['90'] conf: 0.14056571231459125 support: 0.025068058076225044 lift: 3.0410486374611936  
 Rule 124 ] ['49'] ==> ['40', '90'] conf: 0.05251277177141499 support: 0.025068058076225044 lift: 1.5936406056344046  
 Rule 125 ] ['40', '90'] ==> ['49'] conf: 14.487091222030982 support: 0.025068058076225044 lift: 30.347676419965577  
 Rule 126 ] ['33'] ==> ['40', '49'] conf: 0.3443955299695225 support: 0.05767921960072595 lift: 1.047323557161542  
 Rule 127 ] ['40', '49'] ==> ['33'] conf: 0.5093135563987583 support: 0.05767921960072595 lift: 3.041048637461194  
 Rule 128 ] ['49'] ==> ['40', '33'] conf: 0.12082689794463584 support: 0.05767921960072595 lift: 1.3094160200121814  
 Rule 129 ] ['40', '33'] ==> ['49'] conf: 5.173325138291334 support: 0.05767921960072595 lift: 10.837123540258144  
 Rule 130 ] ['40'] ==> ['49', '33'] conf: 0.10038495706248149 support: 0.05767921960072595 lift: 1.1583688239042367  
 Rule 131 ] ['49', '33'] ==> ['40'] conf: 6.630235602094242 support: 0.05767921960072595 lift: 11.539267015706807  
 Rule 132 ] ['33'] ==> ['49', '42'] conf: 0.13274635963427023 support: 0.02223230490018149 lift: 1.288158400149396  
 Rule 133 ] ['49', '42'] ==> ['33'] conf: 1.6252063841496973 support: 0.02223230490018149 lift: 9.703907539900936  
 Rule 134 ] ['42'] ==> ['49', '33'] conf: 0.1328813559322034 support: 0.02223230490018149 lift: 1.5333534475108708  
 Rule 135 ] ['49', '33'] ==> ['42'] conf: 1.9306282722513088 support: 0.02223230490018149 lift: 11.539267015706807  
 Rule 136 ] ['37'] ==> ['40', '39'] conf: 0.6643952299829643 support: 0.022118874773139747 lift: 5.672937866856962  
 Rule 137 ] ['40', '39'] ==> ['37'] conf: 0.28426150121065374 support: 0.022118874773139747 lift: 8.538498789346248  
 Rule 138 ] ['39'] ==> ['40', '37'] conf: 0.12361331220285261 support: 0.022118874773139747 lift: 5.394925546437369  
 Rule 139 ] ['40', '37'] ==> ['39'] conf: 7.8094059405940595 support: 0.022118874773139747 lift: 43.64356435643564  
 Rule 140 ] ['39'] ==> ['49', '42'] conf: 0.15404120443740096 support: 0.027563520871143377 lift: 1.4948016051955166  
 Rule 141 ] ['49', '42'] ==> ['39'] conf: 1.736378646119978 support: 0.027563520871143377 lift: 9.703907539900936  
 Rule 142 ] ['42'] ==> ['49', '39'] conf: 0.16474576271186442 support: 0.027563520871143377 lift: 1.7755484646305584  
 Rule 143 ] ['49', '39'] ==> ['42'] conf: 1.8031784841075793 support: 0.027563520871143377 lift: 10.777506112469437  
 Rule 144 ] ['49'] ==> ['42', '39'] conf: 0.05774028751336581 support: 0.027563520871143377 lift: 1.3360587262935248  
 Rule 145 ] ['42', '39'] ==> ['49'] conf: 11.045931758530184 support: 0.027563520871143377 lift: 23.139107611548557  
 Rule 146 ] ['42'] ==> ['40', '49'] conf: 0.5101694915254238 support: 0.08535617059891107 lift: 1.55145023707766

Rule 147 ] ['40', '49'] ==> ['42'] conf: 0.5087961365988272 support: 0.08535617059891107 lift: 3.0410486374611936  
 Rule 148 ] ['49'] ==> ['40', '42'] conf: 0.17880479980990852 support: 0.08535617059891107 lift: 1.3731211804217363  
 Rule 149 ] ['40', '42'] ==> ['49'] conf: 3.6659407665505226 support: 0.08535617059891107 lift: 7.679442508710801  
 Rule 150 ] ['40'] ==> ['49', '42'] conf: 0.14855394334221694 support: 0.08535617059891107 lift: 1.4415537308805553  
 Rule 151 ] ['49', '42'] ==> ['40'] conf: 5.575674188222345 support: 0.08535617059891107 lift: 9.703907539900936  
 Rule 152 ] ['39'] ==> ['171', '49'] conf: 0.10047543581616482 support: 0.017978675136116153 lift: 5.484776731611821  
 Rule 153 ] ['171', '49'] ==> ['39'] conf: 9.767801857585141 support: 0.017978675136116153 lift: 54.58823529411765  
 Rule 154 ] ['171'] ==> ['49', '39'] conf: 0.4884437596302003 support: 0.017978675136116153 lift: 5.2642056050120365  
 Rule 155 ] ['49', '39'] ==> ['171'] conf: 0.3966992665036675 support: 0.017978675136116153 lift: 10.777506112469437  
 Rule 156 ] ['39'] ==> ['40', '42'] conf: 0.19049128367670365 support: 0.03408575317604356 lift: 1.4628668614057658  
 Rule 157 ] ['40', '42'] ==> ['39'] conf: 1.374128919860627 support: 0.03408575317604356 lift: 7.6794425087108005  
 Rule 158 ] ['42'] ==> ['40', '39'] conf: 0.20372881355932204 support: 0.03408575317604356 lift: 1.7395382279312186  
 Rule 159 ] ['40', '39'] ==> ['42'] conf: 1.4285714285714286 support: 0.03408575317604356 lift: 8.538498789346248  
 Rule 160 ] ['40'] ==> ['42', '39'] conf: 0.05932287039778896 support: 0.03408575317604356 lift: 1.3726782819603869  
 Rule 161 ] ['42', '39'] ==> ['40'] conf: 13.29527559055118 support: 0.03408575317604356 lift: 23.139107611548553  
 Rule 162 ] ['39'] ==> ['40', '49'] conf: 0.3889064976228209 support: 0.0695893829401089 lift: 1.1826835746956845  
 Rule 163 ] ['40', '49'] ==> ['39'] conf: 0.5441531562607796 support: 0.0695893829401089 lift: 3.0410486374611936  
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 Rule 165 ] ['40', '39'] ==> ['49'] conf: 4.076029055690073 support: 0.0695893829401089 lift: 8.538498789346248  
 Rule 166 ] ['40'] ==> ['49', '39'] conf: 0.1211134142730234 support: 0.0695893829401089 lift: 1.3053005626295529  
 Rule 167 ] ['49', '39'] ==> ['40'] conf: 6.192542787286063 support: 0.0695893829401089 lift: 10.777506112469437  
 Rule 168 ] ['171'] ==> ['40', '49'] conf: 0.3790446841294299 support: 0.013951905626134301 lift: 1.1526933202087113  
 Rule 169 ] ['40', '49'] ==> ['171'] conf: 0.111935150051742 support: 0.013951905626134301 lift: 3.041048637461194  
 Rule 170 ] ['39'] ==> ['171', '40'] conf: 0.12741679873217115 support: 0.0227994555353902 lift: 5.506404400111867  
 Rule 171 ] ['171', '40'] ==> ['39'] conf: 7.7328431372549025 support: 0.0227994555353902 lift: 43.21568627450981  
 Rule 172 ] ['171'] ==> ['40', '39'] conf: 0.6194144838212635 support: 0.0227994555353902 lift: 5.2888698202113895  
 Rule 173 ] ['40', '39'] ==> ['171'] conf: 0.3142857142857143 support: 0.0227994555353902 lift: 8.538498789346246  
 Rule 174 ] ['40', '39'] ==> ['49', '33'] conf: 0.11138014527845037 support: 0.013044464609800363 lift: 1.2852452366162546  
 Rule 175 ] ['33', '39'] ==> ['40', '49'] conf: 0.4121863799283154 support: 0.013044464609800363 lift: 1.2534788290610654  
 Rule 176 ] ['40', '33'] ==> ['49', '39'] conf: 0.14136447449293177 support: 0.013044464609800363 lift: 1.523556487933602  
 Rule 177 ] ['49', '39'] ==> ['40', '33'] conf: 0.14058679706601468 support: 0.013044464609800363 lift: 1.5235564879336023  
 Rule 178 ] ['49', '33'] ==> ['40', '39'] conf: 0.1505235602094241 support: 0.013044464609800363 lift: 1.2852452366162546  
 Rule 179 ] ['39'] ==> ['40', '49', '33'] conf: 0.07290015847860538 support: 0.013044464609800363 lift: 1.2638894732495283  
 Rule 180 ] ['40', '49', '33'] ==> ['39'] conf: 3.1022615535889875 support: 0.013044464609800363 lift: 17.337266470009833  
 Rule 181 ] ['33'] ==> ['40', '49', '39'] conf: 0.07788689468337284 support: 0.013044464609800363 lift: 1.1192353113750855  
 Rule 182 ] ['40', '49', '39'] ==> ['33'] conf: 2.406682966585167 support: 0.013044464609800363 lift: 14.370008149959249  
 Rule 183 ] ['40', '42'] ==> ['49', '33'] conf: 0.13545296167247384 support: 0.017638384754990924 lift: 1.5630278928069756  
 Rule 184 ] ['40', '33'] ==> ['49', '42'] conf: 0.19114935464044253 support: 0.017638384754990924 lift: 1.854895663742588  
 Rule 185 ] ['42', '33'] ==> ['40', '49'] conf: 0.5 support: 0.017638384754990924 lift: 1.5205243187305968  
 Rule 186 ] ['40', '49'] ==> ['42', '33'] conf: 0.05363918592618144 support: 0.017638384754990924 lift: 1.520524318730597  
 Rule 187 ] ['49', '42'] ==> ['40', '33'] conf: 0.17116125481563013 support: 0.017638384754990924 lift: 1.854895663742588  
 Rule 188 ] ['49', '33'] ==> ['40', '42'] conf: 0.20353403141361257 support: 0.017638384754990924 lift: 1.5630278928069758  
 Rule 189 ] ['42'] ==> ['40', '49', '33'] conf: 0.10542372881355931 support: 0.017638384754990924 lift: 1.8277592787027315  
 Rule 190 ] ['40', '49', '33'] ==> ['42'] conf: 2.9006882989183875 support: 0.017638384754990924 lift: 17.337266470009833

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Rule 192 ] ['40', '49', '42'] ==> ['33'] conf: 1.9621262458471762 support: 0.017638384754990924 lift: 11.715614617940199  
Rule 193 ] ['111', '39'] ==> ['40', '49'] conf: 0.40409683426443205 support: 0.012307168784029038 lift: 1.2288781272422329  
Rule 194 ] ['40', '39'] ==> ['49', '111'] conf: 0.10508474576271187 support: 0.012307168784029038 lift: 6.259642693540999  
Rule 195 ] ['40', '111'] ==> ['49', '39'] conf: 0.6129943502824858 support: 0.012307168784029038 lift: 6.6065503570787225  
Rule 196 ] ['49', '39'] ==> ['40', '111'] conf: 0.13264058679706603 support: 0.012307168784029038 lift: 6.606550357078723  
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Rule 199 ] ['40', '49', '111'] ==> ['39'] conf: 14.539170506912443 support: 0.012307168784029038 lift: 81.25345622119816  
Rule 200 ] ['111'] ==> ['40', '49', '39'] conf: 0.3938294010889292 support: 0.012307168784029038 lift: 5.659331703341483  
Rule 201 ] ['40', '49', '39'] ==> ['111'] conf: 0.44906275468622653 support: 0.012307168784029038 lift: 14.370008149959249  
Rule 202 ] ['37', '39'] ==> ['40', '49'] conf: 0.3960923623445826 support: 0.012647459165154265 lift: 1.2045361388167783  
Rule 203 ] ['40', '37'] ==> ['49', '39'] conf: 0.5519801980198019 support: 0.012647459165154265 lift: 5.9489699581205056  
Rule 204 ] ['40', '39'] ==> ['49', '37'] conf: 0.1079903147699758 support: 0.012647459165154265 lift: 6.657640664420326  
Rule 205 ] ['49', '37'] ==> ['40', '39'] conf: 0.7797202797202797 support: 0.012647459165154265 lift: 6.657640664420326  
Rule 206 ] ['49', '39'] ==> ['40', '37'] conf: 0.1363080684596577 support: 0.012647459165154265 lift: 5.948969958120506  
Rule 207 ] ['37'] ==> ['40', '49', '39'] conf: 0.3798977853492334 support: 0.012647459165154265 lift: 5.459134271619954  
Rule 208 ] ['40', '49', '39'] ==> ['37'] conf: 0.47840260798696 support: 0.012647459165154265 lift: 14.370008149959249  
Rule 209 ] ['39'] ==> ['40', '49', '37'] conf: 0.07068145800316956 support: 0.012647459165154265 lift: 5.490112191682316  
Rule 210 ] ['40', '49', '37'] ==> ['39'] conf: 13.898678414096917 support: 0.012647459165154265 lift: 77.67400881057269  
Rule 211 ] ['171', '39'] ==> ['40', '49'] conf: 0.3805031446540881 support: 0.013725045372050817 lift: 1.157128569600014  
Rule 212 ] ['40', '39'] ==> ['171', '49'] conf: 0.11719128329297822 support: 0.013725045372050817 lift: 6.397265346816694  
Rule 213 ] ['40', '171'] ==> ['49', '39'] conf: 0.5931372549019608 support: 0.013725045372050817 lift: 6.392540390239225  
Rule 214 ] ['49', '39'] ==> ['40', '171'] conf: 0.14792176039119806 support: 0.013725045372050817 lift: 6.392540390239226  
Rule 215 ] ['171', '49'] ==> ['40', '39'] conf: 0.7492260061919506 support: 0.013725045372050817 lift: 6.397265346816694  
Rule 216 ] ['39'] ==> ['40', '49', '171'] conf: 0.07670364500792393 support: 0.013725045372050817 lift: 5.4977181657711975  
Rule 217 ] ['40', '49', '171'] ==> ['39'] conf: 12.825203252032521 support: 0.013725045372050817 lift: 71.67479674796748  
Rule 218 ] ['171'] ==> ['40', '49', '39'] conf: 0.3728813559322034 support: 0.013725045372050817 lift: 5.358308123713618  
Rule 219 ] ['40', '49', '39'] ==> ['171'] conf: 0.5289323553382232 support: 0.013725045372050817 lift: 14.370008149959249  
Rule 220 ] ['40', '39'] ==> ['49', '42'] conf: 0.19564164648910415 support: 0.022912885662431944 lift: 1.898488448484251  
Rule 221 ] ['42', '39'] ==> ['40', '49'] conf: 0.5301837270341208 support: 0.022912885662431944 lift: 1.6123145007012103  
Rule 222 ] ['40', '42'] ==> ['49', '39'] conf: 0.1759581881533101 support: 0.022912885662431944 lift: 1.896390448361347  
Rule 223 ] ['49', '39'] ==> ['40', '42'] conf: 0.24694376528117362 support: 0.022912885662431944 lift: 1.896390448361347  
Rule 224 ] ['40', '49'] ==> ['42', '39'] conf: 0.06967919972404278 support: 0.022912885662431944 lift: 1.6123145007012103  
Rule 225 ] ['49', '42'] ==> ['40', '39'] conf: 0.22234452394056137 support: 0.022912885662431944 lift: 1.8984884484842508  
Rule 226 ] ['39'] ==> ['40', '49', '42'] conf: 0.12805071315372424 support: 0.022912885662431944 lift: 1.5001928068614392  
Rule 227 ] ['40', '49', '42'] ==> ['39'] conf: 2.0963455149501664 support: 0.022912885662431944 lift: 11.7156146179402  
Rule 228 ] ['42'] ==> ['40', '49', '39'] conf: 0.1369491525423729 support: 0.022912885662431944 lift: 1.9679604381639109  
Rule 229 ] ['40', '49', '39'] ==> ['42'] conf: 2.4042379788101056 support: 0.022912885662431944 lift: 14.370008149959249

-----FOR 0.01 MIN SUPPORT threshold-----

-----FOR 0.3 SAMPLE DATA-----

Frequent sets:

[['243'], ['957'], ['590'], ['79'], ['741'], ['287'], ['32'], ['678'], ['19'], ['1328'], ['180'], ['2239'], ['14099'], ['20'], ['439'], ['176'], ['311'], ['12926'], ['302'], ['102'], ['162'], ['545'], ['523'], ['226'], ['1005'], ['259'], ['148'], ['480'], ['476'], ['784'], ['593'], ['50'], ['250'], ['38'],

['37'], ['124'], ['61'], ['256'], ['1394'], ['534'], ['90'], ['265'], ['16218'], ['13042'], ['15833'], ['46'], ['111'], ['825'], ['80'], ['605'], ['1147'], ['171'], ['66'], ['238'], ['202'], ['16011'], ['33'], ['272'], ['271'], ['118'], ['77'], ['550'], ['414'], ['10'], ['549'], ['339'], ['186'], ['49'], ['42'], ['40'], ['39']] -----Length: 71

[[['49', '102'], ['40', '102'], ['287', '39'], ['40', '12926'], ['49', '226'], ['40', '1147'], ['80', '49'], ['49', '414'], ['40', '1328'], ['50', '49'], ['49', '1328'], ['40', '226'], ['40', '2239'], ['40', '439'], ['49', '439'], ['40', '111'], ['49', '111'], ['40', '311'], ['49', '311'], ['40', '148'], ['476', '49'], ['42', '66'], ['49', '148'], ['80', '40'], ['476', '40'], ['38', '39'], ['171', '49'], ['39', '37'], ['40', '37'], ['49', '37'], ['40', '90'], ['49', '90'], ['40', '256'], ['49', '256'], ['61', '40'], ['61', '49'], ['40', '534'], ['534', '49'], ['111', '39'], ['171', '39'], ['171', '40'], ['40', '16011'], ['238', '40'], ['238', '49'], ['40', '66'], ['49', '66'], ['33', '39'], ['42', '33'], ['271', '40'], ['271', '49'], ['40', '272'], ['49', '272'], ['40', '33'], ['49', '33'], ['40', '414'], ['40', '39'], ['42', '39'], ['40', '42'], ['49', '39'], ['40', '49'], ['49', '42']] -----Length: 61

[[['40', '49', '102'], ['40', '49', '226'], ['49', '111', '39'], ['40', '49', '111'], ['40', '111', '39'], ['40', '49', '311'], ['476', '49', '40'], ['49', '42', '33'], ['49', '33', '39'], ['49', '39', '37'], ['40', '49', '37'], ['40', '39', '37'], ['171', '49', '40'], ['171', '49', '39'], ['40', '49', '90'], ['171', '40', '39'], ['40', '49', '66'], ['238', '49', '40'], ['40', '42', '33'], ['40', '33', '39'], ['40', '49', '33'], ['49', '42', '39'], ['40', '49', '42'], ['40', '49', '39'], ['40', '42', '39']] -----Length: 25

[[['49', '33', '42', '40'], ['49', '40', '111', '39'], ['49', '33', '40', '39'], ['49', '40', '171', '39'], ['49', '40', '39', '37'], ['49', '42', '40', '39']] -----Length: 6

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**Execution Time: 0:01:12.289552**

**No of Candidate sets: 16271**

**No of frequent sets: 163**

Rule 1 ] ['102'] ==> ['49'] conf: 0.5683453237410072 support: 0.014934966727162734 lift: 1.1880807083703888  
Rule 2 ] ['102'] ==> ['40'] conf: 0.623021582733813 support: 0.016371748336358138 lift: 1.0864878557394098  
Rule 3 ] ['39'] ==> ['287'] conf: 0.07526435828322621 support: 0.013725045372050817 lift: 5.238399336512544  
Rule 4 ] ['287'] ==> ['39'] conf: 0.9552631578947369 support: 0.013725045372050817 lift: 5.238399336512545  
Rule 5 ] ['12926'] ==> ['40'] conf: 0.6690821256038648 support: 0.010473381730187538 lift: 1.166812874717857  
Rule 6 ] ['226'] ==> ['49'] conf: 0.5121436114044351 support: 0.018337870538415003 lift: 1.0705954975043075  
Rule 7 ] ['1147'] ==> ['40'] conf: 0.6905940594059405 support: 0.010549001814882032 lift: 1.204327553947535  
Rule 8 ] ['80'] ==> ['49'] conf: 0.5661157024793388 support: 0.010359951603145796 lift: 1.183419862407015  
Rule 9 ] ['414'] ==> ['49'] conf: 0.5923344947735192 support: 0.012855414398064126 lift: 1.2382281629600091  
Rule 10 ] ['1328'] ==> ['40'] conf: 0.6296992481203008 support: 0.012666364186327888 lift: 1.0981330419547486  
Rule 11 ] ['50'] ==> ['49'] conf: 0.7749287749287749 support: 0.0102843315184513 lift: 1.6199269869835786  
Rule 12 ] ['1328'] ==> ['49'] conf: 0.5601503759398496 support: 0.011267392619479734 lift: 1.1709498215979404  
Rule 13 ] ['226'] ==> ['40'] conf: 0.7053854276663147 support: 0.025257108287961284 lift: 1.2301222333455555  
Rule 14 ] ['2239'] ==> ['40'] conf: 0.7353535353535353 support: 0.013762855414398064 lift: 1.2823836412389755  
Rule 15 ] ['439'] ==> ['40'] conf: 0.6558558558558559 support: 0.013762855414398064 lift: 1.1437475719158432  
Rule 16 ] ['439'] ==> ['49'] conf: 0.5477477477477478 support: 0.011494252873563218 lift: 1.145023113534021  
Rule 17 ] ['111'] ==> ['40'] conf: 0.6371061843640606 support: 0.020644283121597096 lift: 1.1110500042239666  
Rule 18 ] ['111'] ==> ['49'] conf: 0.4889148191365228 support: 0.015842407743496673 lift: 1.0220375542619946  
Rule 19 ] ['311'] ==> ['40'] conf: 0.7107540173053152 support: 0.021740774349667272 lift: 1.2394845212772634  
Rule 20 ] ['311'] ==> ['49'] conf: 0.6489493201483312 support: 0.0198502722323049 lift: 1.356576953784624  
Rule 21 ] ['148'] ==> ['40'] conf: 0.6276391554702495 support: 0.01236388384754991 lift: 1.0945404446707874  
Rule 22 ] ['476'] ==> ['49'] conf: 0.6434911242603549 support: 0.01644736842105263 lift: 1.3451670292789968  
Rule 23 ] ['66'] ==> ['42'] conf: 0.20945945945945946 support: 0.010549001814882032 lift: 1.228333433211482  
Rule 24 ] ['42'] ==> ['66'] conf: 0.06186252771618625 support: 0.010549001814882032 lift: 1.228333433211482  
Rule 25 ] ['148'] ==> ['49'] conf: 0.5681381957773513 support: 0.01119177253478524 lift: 1.1876477238317567

Rule 26 ] ['80'] ==> ['40'] conf: 0.6838842975206612 support: 0.012515124016938899 lift: 1.1926263946212876  
 Rule 27 ] ['476'] ==> ['40'] conf: 0.6760355029585798 support: 0.017279189352692074 lift: 1.1789388752636503  
 Rule 28 ] ['39'] ==> ['38'] conf: 0.06780012440389799 support: 0.01236388384754991 lift: 5.401137621187632  
 Rule 29 ] ['38'] ==> ['39'] conf: 0.9849397590361445 support: 0.01236388384754991 lift: 5.401137621187632  
 Rule 30 ] ['171'] ==> ['49'] conf: 0.47859495060373225 support: 0.01648517846339988 lift: 1.0004646896591456  
 Rule 31 ] ['37'] ==> ['39'] conf: 0.9490238611713666 support: 0.0330837870538415 lift: 5.2041847564296715  
 Rule 32 ] ['39'] ==> ['37'] conf: 0.18142235123367198 support: 0.0330837870538415 lift: 5.2041847564296715  
 Rule 33 ] ['37'] ==> ['40'] conf: 0.6854663774403471 support: 0.023895946763460376 lift: 1.195385385107629  
 Rule 34 ] ['37'] ==> ['49'] conf: 0.4837310195227766 support: 0.016863278886872352 lift: 1.0112012333495413  
 Rule 35 ] ['90'] ==> ['40'] conf: 0.7038019451812555 support: 0.030096793708408953 lift: 1.2273607969242943  
 Rule 36 ] ['40'] ==> ['90'] conf: 0.052485823552683636 support: 0.030096793708408953 lift: 1.2273607969242941  
 Rule 37 ] ['90'] ==> ['49'] conf: 0.7206012378426171 support: 0.030815184513006653 lift: 1.5063595904569662  
 Rule 38 ] ['49'] ==> ['90'] conf: 0.06441669301296238 support: 0.030815184513006653 lift: 1.5063595904569664  
 Rule 39 ] ['256'] ==> ['40'] conf: 0.6834061135371179 support: 0.011834543254688445 lift: 1.1917924891751084  
 Rule 40 ] ['256'] ==> ['49'] conf: 0.6921397379912663 support: 0.011985783424077434 lift: 1.4468630880803834  
 Rule 41 ] ['61'] ==> ['40'] conf: 0.6659663865546218 support: 0.011985783424077434 lift: 1.1613793348013082  
 Rule 42 ] ['61'] ==> ['49'] conf: 0.5567226890756303 support: 0.01001966122202057 lift: 1.1637845147543684  
 Rule 43 ] ['534'] ==> ['40'] conf: 0.6266094420600857 support: 0.011040532365396248 lift: 1.0927447265993109  
 Rule 44 ] ['534'] ==> ['49'] conf: 0.592274678111588 support: 0.010435571687840291 lift: 1.2381031209844513  
 Rule 45 ] ['39'] ==> ['111'] conf: 0.17271407837445577 support: 0.03149576527525711 lift: 5.33015396131576  
 Rule 46 ] ['111'] ==> ['39'] conf: 0.9719953325554259 support: 0.03149576527525711 lift: 5.330153961315759  
 Rule 47 ] ['39'] ==> ['171'] conf: 0.18432510885341075 support: 0.03361312764670296 lift: 5.3512958056586255  
 Rule 48 ] ['171'] ==> ['39'] conf: 0.9758507135016465 support: 0.03361312764670296 lift: 5.3512958056586255  
 Rule 49 ] ['171'] ==> ['40'] conf: 0.6717892425905598 support: 0.023139745916515426 lift: 1.1715338182800428  
 Rule 50 ] ['16011'] ==> ['40'] conf: 0.6596736596736595 support: 0.010700241984271022 lift: 1.1504054431655644  
 Rule 51 ] ['238'] ==> ['40'] conf: 0.6269315673289183 support: 0.02147610405323654 lift: 1.0933064811232516  
 Rule 52 ] ['238'] ==> ['49'] conf: 0.5474613686534217 support: 0.018753781004234724 lift: 1.1444244608082277  
 Rule 53 ] ['66'] ==> ['40'] conf: 0.6351351351351352 support: 0.031987295825771325 lift: 1.1076126898360845  
 Rule 54 ] ['40'] ==> ['66'] conf: 0.05578267176579191 support: 0.031987295825771325 lift: 1.1076126898360843  
 Rule 55 ] ['66'] ==> ['49'] conf: 0.5735735735735735 support: 0.028886872353297035 lift: 1.1990099489309098  
 Rule 56 ] ['49'] ==> ['66'] conf: 0.060385709769206444 support: 0.028886872353297035 lift: 1.19900994893091  
 Rule 57 ] ['39'] ==> ['33'] conf: 0.18308106987352274 support: 0.03338626739261948 lift: 1.0696108098111177  
 Rule 58 ] ['33'] ==> ['39'] conf: 0.1950519107576762 support: 0.03338626739261948 lift: 1.0696108098111177  
 Rule 59 ] ['33'] ==> ['42'] conf: 0.21802518223989398 support: 0.03731851179673321 lift: 1.2785654146076975  
 Rule 60 ] ['42'] ==> ['33'] conf: 0.2188470066518847 support: 0.03731851179673321 lift: 1.2785654146076975  
 Rule 61 ] ['271'] ==> ['40'] conf: 0.6698841698841699 support: 0.013120084694494858 lift: 1.168211560404624  
 Rule 62 ] ['271'] ==> ['49'] conf: 0.5540540540540541 support: 0.010851482153660013 lift: 1.1582059454332612  
 Rule 63 ] ['272'] ==> ['40'] conf: 0.6735668789808917 support: 0.015993647912885663 lift: 1.174633839858013  
 Rule 64 ] ['272'] ==> ['49'] conf: 0.535031847133758 support: 0.012704174228675136 lift: 1.1184415343814125  
 Rule 65 ] ['33'] ==> ['40'] conf: 0.5559973492379059 support: 0.09516787658802178 lift: 0.9696042392617787  
 Rule 66 ] ['40'] ==> ['33'] conf: 0.16596333904787025 support: 0.09516787658802178 lift: 0.9696042392617787  
 Rule 67 ] ['33'] ==> ['49'] conf: 0.527722553567484 support: 0.09032819116757411 lift: 1.1031620373658564  
 Rule 68 ] ['49'] ==> ['33'] conf: 0.18882390135946886 support: 0.09032819116757411 lift: 1.1031620373658566  
 Rule 69 ] ['414'] ==> ['40'] conf: 0.5958188153310104 support: 0.01293103448275862 lift: 1.0390489270654468



Rule 70 ] ['39'] ==> ['40'] conf: 0.6574746008708273 support: 0.11989564428312159 lift: 1.1465705026923145  
 Rule 71 ] ['40'] ==> ['39'] conf: 0.2090861136753264 support: 0.11989564428312159 lift: 1.1465705026923145  
 Rule 72 ] ['39'] ==> ['42'] conf: 0.24963715529753266 support: 0.0455232909860859 lift: 1.4639475572747547  
 Rule 73 ] ['42'] ==> ['39'] conf: 0.26696230598669624 support: 0.0455232909860859 lift: 1.463947557274755  
 Rule 74 ] ['42'] ==> ['40'] conf: 0.7620842572062085 support: 0.12995311554748942 lift: 1.32899936928589  
 Rule 75 ] ['40'] ==> ['42'] conf: 0.2266253461690624 support: 0.12995311554748942 lift: 1.3289993692858897  
 Rule 76 ] ['39'] ==> ['49'] conf: 0.5073605639643376 support: 0.09252117362371445 lift: 1.060596917145811  
 Rule 77 ] ['49'] ==> ['39'] conf: 0.19340815681315204 support: 0.09252117362371445 lift: 1.0605969171458107  
 Rule 78 ] ['49'] ==> ['40'] conf: 0.6973601011697755 support: 0.33359800362976405 lift: 1.2161268598007533  
 Rule 79 ] ['40'] ==> ['49'] conf: 0.5817618356850851 support: 0.33359800362976405 lift: 1.2161268598007533  
 Rule 80 ] ['42'] ==> ['49'] conf: 0.6073170731707318 support: 0.10356170598911071 lift: 1.2695480517878213  
 Rule 81 ] ['49'] ==> ['42'] conf: 0.2164875118558331 support: 0.10356170598911071 lift: 1.2695480517878213  
 Rule 82 ] ['102'] ==> ['40', '49'] conf: 0.40431654676258993 support: 0.010624621899576527 lift: 1.2119873091666076  
 Rule 83 ] ['40', '49'] ==> ['102'] conf: 0.07877139295024368 support: 0.010624621899576527 lift: 2.997619857191432  
 Rule 84 ] ['226'] ==> ['40', '49'] conf: 0.4002111932418163 support: 0.014330006049606776 lift: 1.1996810199319459  
 Rule 85 ] ['40', '49'] ==> ['226'] conf: 0.10733310665306585 support: 0.014330006049606776 lift: 2.997619857191432  
 Rule 86 ] ['39'] ==> ['49', '111'] conf: 0.08563134978229318 support: 0.015615547489413188 lift: 5.405197945207852  
 Rule 87 ] ['49', '111'] ==> ['39'] conf: 11.510739856801909 support: 0.015615547489413188 lift: 63.12171837708831  
 Rule 88 ] ['111'] ==> ['49', '39'] conf: 0.4819136522753792 support: 0.015615547489413188 lift: 5.208685032848071  
 Rule 89 ] ['49', '39'] ==> ['111'] conf: 0.3502247650183899 support: 0.015615547489413188 lift: 10.808336738863916  
 Rule 90 ] ['111'] ==> ['40', '49'] conf: 0.3757292882147025 support: 0.012174833635813672 lift: 1.1262935752807948  
 Rule 91 ] ['40', '49'] ==> ['111'] conf: 0.09713249461634366 support: 0.012174833635813672 lift: 2.997619857191432  
 Rule 92 ] ['39'] ==> ['40', '111'] conf: 0.11196350818992329 support: 0.02041742286751361 lift: 5.423463121991009  
 Rule 93 ] ['40', '111'] ==> ['39'] conf: 8.833333333333332 support: 0.02041742286751361 lift: 48.43956043956044  
 Rule 94 ] ['111'] ==> ['40', '39'] conf: 0.6301050175029171 support: 0.02041742286751361 lift: 5.255445443997841  
 Rule 95 ] ['40', '39'] ==> ['111'] conf: 0.27026174708293915 support: 0.02041742286751361 lift: 8.34058656575213  
 Rule 96 ] ['311'] ==> ['40', '49'] conf: 0.5253399258343633 support: 0.016069267997580156 lift: 1.5747693934565614  
 Rule 97 ] ['40', '49'] ==> ['311'] conf: 0.09169216819675848 support: 0.016069267997580156 lift: 2.9976198571914314  
 Rule 98 ] ['476'] ==> ['40', '49'] conf: 0.49260355029585795 support: 0.012590744101633394 lift: 1.476638184089862  
 Rule 99 ] ['40', '49'] ==> ['476'] conf: 0.07661793040915789 support: 0.012590744101633394 lift: 2.997619857191432  
 Rule 100 ] ['33'] ==> ['49', '42'] conf: 0.138060525734482 support: 0.023631276467029644 lift: 1.3331233240692149  
 Rule 101 ] ['49', '42'] ==> ['33'] conf: 1.6527929901423877 support: 0.023631276467029644 lift: 9.656078860898138  
 Rule 102 ] ['42'] ==> ['49', '33'] conf: 0.1385809312638581 support: 0.023631276467029644 lift: 1.5341935831170024  
 Rule 103 ] ['49', '33'] ==> ['42'] conf: 1.8878191712013395 support: 0.023631276467029644 lift: 11.070740895772289  
 Rule 104 ] ['39'] ==> ['49', '33'] conf: 0.10346257516068838 support: 0.018867211131276467 lift: 1.1454073620133471  
 Rule 105 ] ['49', '33'] ==> ['39'] conf: 2.018836333193805 support: 0.018867211131276467 lift: 11.070740895772289  
 Rule 106 ] ['33'] ==> ['49', '39'] conf: 0.11022752374641043 support: 0.018867211131276467 lift: 1.1913761945423225  
 Rule 107 ] ['49', '39'] ==> ['33'] conf: 1.85002043318349 support: 0.018867211131276467 lift: 10.808336738863915  
 Rule 108 ] ['37'] ==> ['49', '39'] conf: 0.4652928416485901 support: 0.01622050816696915 lift: 5.029041714720846  
 Rule 109 ] ['49', '39'] ==> ['37'] conf: 0.3767879035553739 support: 0.01622050816696915 lift: 10.808336738863915  
 Rule 110 ] ['39'] ==> ['49', '37'] conf: 0.08894878706199462 support: 0.01622050816696915 lift: 5.274702960124739  
 Rule 111 ] ['49', '37'] ==> ['39'] conf: 10.81390134529148 support: 0.01622050816696915 lift: 59.300448430493276  
 Rule 112 ] ['37'] ==> ['40', '49'] conf: 0.3785249457700651 support: 0.013195704779189353 lift: 1.134673893882657  
 Rule 113 ] ['40', '49'] ==> ['37'] conf: 0.1044996033095319 support: 0.013195704779189353 lift: 2.9976198571914314

Rule 114 ] ['37'] ==>> ['40', '39'] conf: 0.6529284164859003 support: 0.02276164549304295 lift: 5.445805978940111  
 Rule 115 ] ['40', '39'] ==>> ['37'] conf: 0.2907600126143172 support: 0.02276164549304295 lift: 8.340586565752128  
 Rule 116 ] ['39'] ==>> ['40', '37'] conf: 0.12481857764876633 support: 0.02276164549304295 lift: 5.223420477301538  
 Rule 117 ] ['40', '37'] ==>> ['39'] conf: 7.63132911392405 support: 0.02276164549304295 lift: 41.848101265822784  
 Rule 118 ] ['171'] ==>> ['40', '49'] conf: 0.37760702524698136 support: 0.013006654567453115 lift: 1.1319223170953376  
 Rule 119 ] ['40', '49'] ==>> ['171'] conf: 0.10325286183837697 support: 0.013006654567453115 lift: 2.997619857191432  
 Rule 120 ] ['39'] ==>> ['171', '49'] conf: 0.08977814638191997 support: 0.016371748336358138 lift: 5.445991778690411  
 Rule 121 ] ['171', '49'] ==>> ['39'] conf: 11.061926605504585 support: 0.016371748336358138 lift: 60.66055045871558  
 Rule 122 ] ['171'] ==>> ['49', '39'] conf: 0.4753018660812295 support: 0.016371748336358138 lift: 5.137222621216329  
 Rule 123 ] ['49', '39'] ==>> ['171'] conf: 0.3722926031875766 support: 0.016371748336358138 lift: 10.808336738863916  
 Rule 124 ] ['90'] ==>> ['40', '49'] conf: 0.5490716180371353 support: 0.023480036297640654 lift: 1.6459079852483458  
 Rule 125 ] ['40', '49'] ==>> ['90'] conf: 0.1281876912614757 support: 0.023480036297640654 lift: 2.9976198571914314  
 Rule 126 ] ['39'] ==>> ['171', '40'] conf: 0.12419655815882233 support: 0.02264821536600121 lift: 5.3672394937655765  
 Rule 127 ] ['171', '40'] ==>> ['39'] conf: 7.8807189542483655 support: 0.02264821536600121 lift: 43.21568627450981  
 Rule 128 ] ['171'] ==>> ['40', '39'] conf: 0.6575192096597147 support: 0.02264821536600121 lift: 5.484095886811773  
 Rule 129 ] ['40', '39'] ==>> ['171'] conf: 0.28729107537054555 support: 0.02264821536600121 lift: 8.340586565752128  
 Rule 130 ] ['66'] ==>> ['40', '49'] conf: 0.41741741741741745 support: 0.02102238354506957 lift: 1.251258739188015  
 Rule 131 ] ['40', '49'] ==>> ['66'] conf: 0.15096905814348863 support: 0.02102238354506957 lift: 2.997619857191432  
 Rule 132 ] ['238'] ==>> ['40', '49'] conf: 0.4006622516556292 support: 0.013725045372050817 lift: 1.2010331215899446  
 Rule 133 ] ['40', '49'] ==>> ['238'] conf: 0.10268616116967018 support: 0.013725045372050817 lift: 2.9976198571914314  
 Rule 134 ] ['33'] ==>> ['40', '42'] conf: 0.1610337972166998 support: 0.027563520871143377 lift: 1.239168422690508  
 Rule 135 ] ['40', '42'] ==>> ['33'] conf: 1.3171370381146348 support: 0.027563520871143377 lift: 7.695082921152167  
 Rule 136 ] ['42'] ==>> ['40', '33'] conf: 0.1616407982261641 support: 0.027563520871143377 lift: 1.6984806640785013  
 Rule 137 ] ['40', '33'] ==>> ['42'] conf: 1.7918156535558203 support: 0.027563520871143377 lift: 10.507747318235994  
 Rule 138 ] ['39'] ==>> ['40', '33'] conf: 0.11486626580966204 support: 0.020946763460375075 lift: 1.2069856965172592  
 Rule 139 ] ['40', '33'] ==>> ['39'] conf: 1.9161700437028206 support: 0.020946763460375075 lift: 10.507747318235994  
 Rule 140 ] ['33'] ==>> ['40', '39'] conf: 0.12237685001104484 support: 0.020946763460375075 lift: 1.020694711161184  
 Rule 141 ] ['40', '39'] ==>> ['33'] conf: 1.4276253547776727 support: 0.020946763460375075 lift: 8.34058656575213  
 Rule 142 ] ['33'] ==>> ['40', '49'] conf: 0.35409763640379943 support: 0.06060949788263763 lift: 1.0614501062685808  
 Rule 143 ] ['40', '49'] ==>> ['33'] conf: 0.5130907854471268 support: 0.06060949788263763 lift: 2.9976198571914314  
 Rule 144 ] ['49'] ==>> ['40', '33'] conf: 0.12669933607334807 support: 0.06060949788263763 lift: 1.3313246088470043  
 Rule 145 ] ['40', '33'] ==>> ['49'] conf: 5.026618990862137 support: 0.06060949788263763 lift: 10.507747318235994  
 Rule 146 ] ['40'] ==>> ['49', '33'] conf: 0.10569695371225109 support: 0.06060949788263763 lift: 1.170143588020769  
 Rule 147 ] ['49', '33'] ==>> ['40'] conf: 6.348262871494349 support: 0.06060949788263763 lift: 11.070740895772289  
 Rule 148 ] ['39'] ==>> ['49', '42'] conf: 0.15135807588637779 support: 0.027601330913490624 lift: 1.4615255169926686  
 Rule 149 ] ['49', '42'] ==>> ['39'] conf: 1.7608616283315077 support: 0.027601330913490624 lift: 9.656078860898138  
 Rule 150 ] ['42'] ==>> ['49', '39'] conf: 0.16186252771618626 support: 0.027601330913490624 lift: 1.7494647049602348  
 Rule 151 ] ['49', '39'] ==>> ['42'] conf: 1.8430731507968943 support: 0.027601330913490624 lift: 10.808336738863916  
 Rule 152 ] ['49'] ==>> ['42', '39'] conf: 0.0576983876067025 support: 0.027601330913490624 lift: 1.267447637393744  
 Rule 153 ] ['42', '39'] ==>> ['49'] conf: 10.508305647840533 support: 0.027601330913490624 lift: 21.966777408637878  
 Rule 154 ] ['42'] ==>> ['40', '49'] conf: 0.49933481152993353 support: 0.08514821536600121 lift: 1.4968159464290698  
 Rule 155 ] ['40', '49'] ==>> ['42'] conf: 0.5111640031735237 support: 0.08514821536600121 lift: 2.9976198571914314  
 Rule 156 ] ['49'] ==>> ['40', '42'] conf: 0.1779955738223206 support: 0.08514821536600121 lift: 1.369690700160819  
 Rule 157 ] ['40', '42'] ==>> ['49'] conf: 3.681117253418679 support: 0.08514821536600121 lift: 7.695082921152167

Rule 158 ]['40'] ==> ['49', '42'] conf: 0.14849004351839643 support: 0.08514821536600121 lift: 1.4338315702718323  
 Rule 159 ]['49', '42'] ==> ['40'] conf: 5.53705732018985 support: 0.08514821536600121 lift: 9.656078860898138  
 Rule 160 ]['39'] ==> ['40', '49'] conf: 0.3914575990047688 support: 0.07138535995160314 lift: 1.1734410720251758  
 Rule 161 ]['40', '49'] ==> ['39'] conf: 0.5466394650345687 support: 0.07138535995160314 lift: 2.9976198571914314  
 Rule 162 ]['49'] ==> ['40', '39'] conf: 0.14922541890610178 support: 0.07138535995160314 lift: 1.2446275241969662  
 Rule 163 ]['40', '39'] ==> ['49'] conf: 3.989908546199937 support: 0.07138535995160314 lift: 8.34058656575213  
 Rule 164 ]['40'] ==> ['49', '39'] conf: 0.12448898852696821 support: 0.07138535995160314 lift: 1.345518908280039  
 Rule 165 ]['49', '39'] ==> ['40'] conf: 6.197793216183081 support: 0.07138535995160314 lift: 10.808336738863915  
 Rule 166 ]['39'] ==> ['40', '42'] conf: 0.1955214596724031 support: 0.035654869933454326 lift: 1.5045538450438511  
 Rule 167 ]['40', '42'] ==> ['39'] conf: 1.4032586558044804 support: 0.035654869933454326 lift: 7.695082921152166  
 Rule 168 ]['42'] ==> ['40', '39'] conf: 0.2090909090909091 support: 0.035654869933454326 lift: 1.7439408273845363  
 Rule 169 ]['40', '39'] ==> ['42'] conf: 1.4222642699463892 support: 0.035654869933454326 lift: 8.34058656575213  
 Rule 170 ]['40'] ==> ['42', '39'] conf: 0.06217855729922195 support: 0.035654869933454326 lift: 1.3658625277822443  
 Rule 171 ]['42', '39'] ==> ['40'] conf: 12.596345514950166 support: 0.035654869933454326 lift: 21.966777408637874  
 Rule 172 ]['40', '42'] ==> ['49', '33'] conf: 0.14634855979051498 support: 0.019018451300665457 lift: 1.6201869859102302  
 Rule 173 ]['40', '33'] ==> ['49', '42'] conf: 0.19984108065156933 support: 0.019018451300665457 lift: 1.9296812344186585  
 Rule 174 ]['42', '33'] ==> ['40', '49'] conf: 0.5096251266464032 support: 0.019018451300665457 lift: 1.5276623993589566  
 Rule 175 ]['40', '49'] ==> ['42', '33'] conf: 0.05701008727190298 support: 0.019018451300665457 lift: 1.5276623993589566  
 Rule 176 ]['49', '42'] ==> ['40', '33'] conf: 0.1836436655713764 support: 0.019018451300665457 lift: 1.9296812344186582  
 Rule 177 ]['49', '33'] ==> ['40', '42'] conf: 0.21054834658853075 support: 0.019018451300665457 lift: 1.62018698591023  
 Rule 178 ]['42'] ==> ['40', '49', '33'] conf: 0.11152993348115299 support: 0.019018451300665457 lift: 1.8401395388081936  
 Rule 179 ]['40', '49', '33'] ==> ['42'] conf: 2.813474734872115 support: 0.019018451300665457 lift: 16.49906425452277  
 Rule 180 ]['33'] ==> ['40', '49', '42'] conf: 0.1111111111111111 support: 0.019018451300665457 lift: 1.304914150384843  
 Rule 181 ]['40', '49', '42'] ==> ['33'] conf: 2.0102131438721136 support: 0.019018451300665457 lift: 11.744227353463588  
 Rule 182 ]['111', '39'] ==> ['40', '49'] conf: 0.3841536614645858 support: 0.012099213551119177 lift: 1.1515466438190372  
 Rule 183 ]['40', '39'] ==> ['49', '111'] conf: 0.10091453800063072 support: 0.012099213551119177 lift: 6.369899047829787  
 Rule 184 ]['40', '111'] ==> ['49', '39'] conf: 0.58608058680805861 support: 0.012099213551119177 lift: 6.334556330469694  
 Rule 185 ]['49', '39'] ==> ['40', '111'] conf: 0.13077237433592154 support: 0.012099213551119177 lift: 6.3345563304696935  
 Rule 186 ]['49', '111'] ==> ['40', '39'] conf: 0.7637231503579952 support: 0.012099213551119177 lift: 6.369899047829788  
 Rule 187 ]['39'] ==> ['40', '49', '111'] conf: 0.06634874559402862 support: 0.012099213551119177 lift: 5.449663426928164  
 Rule 188 ]['40', '49', '111'] ==> ['39'] conf: 14.978260869565217 support: 0.012099213551119177 lift: 82.13664596273291  
 Rule 189 ]['111'] ==> ['40', '49', '39'] conf: 0.3733955659276546 support: 0.012099213551119177 lift: 5.2307022921899415  
 Rule 190 ]['40', '49', '39'] ==> ['111'] conf: 0.45391949152542377 support: 0.012099213551119177 lift: 14.008474576271187  
 Rule 191 ]['40', '39'] ==> ['49', '33'] conf: 0.11510564490696942 support: 0.013800665456745312 lift: 1.2743047704058297  
 Rule 192 ]['33', '39'] ==> ['40', '49'] conf: 0.4133635334088335 support: 0.013800665456745312 lift: 1.2391067359851329  
 Rule 193 ]['40', '33'] ==> ['49', '39'] conf: 0.14501390544298767 support: 0.013800665456745312 lift: 1.5673591218455816  
 Rule 194 ]['49', '39'] ==> ['40', '33'] conf: 0.1491622394769105 support: 0.013800665456745312 lift: 1.5673591218455816  
 Rule 195 ]['49', '33'] ==> ['40', '39'] conf: 0.1527835914608623 support: 0.013800665456745312 lift: 1.2743047704058297  
 Rule 196 ]['39'] ==> ['40', '49', '33'] conf: 0.07567903794318889 support: 0.013800665456745312 lift: 1.2486333097451403  
 Rule 197 ]['40', '49', '33'] ==> ['39'] conf: 3.0087336244541483 support: 0.013800665456745312 lift: 16.499064254522768  
 Rule 198 ]['33'] ==> ['40', '49', '39'] conf: 0.0806273470289375 support: 0.013800665456745312 lift: 1.1294661410070652  
 Rule 199 ]['40', '49', '39'] ==> ['33'] conf: 2.3977754237288136 support: 0.013800665456745312 lift: 14.008474576271187  
 Rule 200 ]['171', '39'] ==> ['40', '49'] conf: 0.3847019122609674 support: 0.01293103448275862 lift: 1.1531900912929918  
 Rule 201 ]['40', '39'] ==> ['171', '49'] conf: 0.10785241248817408 support: 0.01293103448275862 lift: 6.5423867098330915

Rule 202 ] ['40', '171'] ==> ['49', '39'] conf: 0.5588235294117647 support: 0.01293103448275862 lift: 6.039952883482776  
 Rule 203 ] ['49', '39'] ==> ['40', '171'] conf: 0.13976297507151614 support: 0.01293103448275862 lift: 6.039952883482776  
 Rule 204 ] ['171', '49'] ==> ['40', '39'] conf: 0.7844036697247706 support: 0.01293103448275862 lift: 6.5423867098330915  
 Rule 205 ] ['39'] ==> ['40', '49', '171'] conf: 0.07091022185361809 support: 0.01293103448275862 lift: 5.4518417080944515  
 Rule 206 ] ['40', '49', '171'] ==> ['39'] conf: 14.020348837209301 support: 0.01293103448275862 lift: 76.88372093023256  
 Rule 207 ] ['171'] ==> ['40', '49', '39'] conf: 0.3754116355653129 support: 0.01293103448275862 lift: 5.25894435245307  
 Rule 208 ] ['40', '49', '39'] ==> ['171'] conf: 0.482521186440678 support: 0.01293103448275862 lift: 14.008474576271189  
 Rule 209 ] ['37', '39'] ==> ['40', '49'] conf: 0.3851428571428572 support: 0.012741984271022383 lift: 1.1545118764268716  
 Rule 210 ] ['40', '37'] ==> ['49', '39'] conf: 0.5332278481012658 support: 0.012741984271022383 lift: 5.763306140818258  
 Rule 211 ] ['40', '39'] ==> ['49', '37'] conf: 0.10627562283191422 support: 0.012741984271022383 lift: 6.302192091162483  
 Rule 212 ] ['49', '37'] ==> ['40', '39'] conf: 0.7556053811659192 support: 0.012741984271022383 lift: 6.302192091162483  
 Rule 213 ] ['49', '39'] ==> ['40', '37'] conf: 0.13771965672251738 support: 0.012741984271022383 lift: 5.763306140818258  
 Rule 214 ] ['37'] ==> ['40', '49', '39'] conf: 0.36550976138828634 support: 0.012741984271022383 lift: 5.120234199786758  
 Rule 215 ] ['40', '49', '39'] ==> ['37'] conf: 0.4883474576271186 support: 0.012741984271022383 lift: 14.008474576271187  
 Rule 216 ] ['39'] ==> ['40', '49', '37'] conf: 0.06987352270371139 support: 0.012741984271022383 lift: 5.295171714807331  
 Rule 217 ] ['40', '49', '37'] ==> ['39'] conf: 13.819484240687679 support: 0.012741984271022383 lift: 75.78223495702007  
 Rule 218 ] ['40', '39'] ==> ['49', '42'] conf: 0.19489120151371808 support: 0.02336660617059891 lift: 1.8818848111116522  
 Rule 219 ] ['42', '39'] ==> ['40', '49'] conf: 0.5132890365448506 support: 0.02336660617059891 lift: 1.5386454084255026  
 Rule 220 ] ['40', '42'] ==> ['49', '39'] conf: 0.17980797206866453 support: 0.02336660617059891 lift: 1.9434251104503637  
 Rule 221 ] ['49', '39'] ==> ['40', '42'] conf: 0.2525541479362485 support: 0.02336660617059891 lift: 1.9434251104503635  
 Rule 222 ] ['40', '49'] ==> ['42', '39'] conf: 0.07004420265215913 support: 0.02336660617059891 lift: 1.5386454084255023  
 Rule 223 ] ['49', '42'] ==> ['40', '39'] conf: 0.22562979189485213 support: 0.02336660617059891 lift: 1.8818848111116524  
 Rule 224 ] ['39'] ==> ['40', '49', '42'] conf: 0.12813601492846777 support: 0.02336660617059891 lift: 1.5048584914867298  
 Rule 225 ] ['40', '49', '42'] ==> ['39'] conf: 2.141651865008881 support: 0.02336660617059891 lift: 11.744227353463588  
 Rule 226 ] ['42'] ==> ['40', '49', '39'] conf: 0.13702882483370288 support: 0.02336660617059891 lift: 1.9195648088992447  
 Rule 227 ] ['40', '49', '39'] ==> ['42'] conf: 2.388771186440678 support: 0.02336660617059891 lift: 14.008474576271189

-----FOR 0.03 MIN SUPPORT threshold-----

-----FOR 0.1 SAMPLE DATA-----

Frequent set:

['37'], ['90'], ['66'], ['111'], ['238'], ['171'], ['39'], ['33'], ['49'], ['226'], ['40'], ['42']] -----Length: 12

['49', '66'], ['42', '39'], ['39', '37'], ['40', '66'], ['111', '39'], ['171', '39'], ['40', '39'], ['49', '39'], ['33', '39'], ['42', '33'], ['40', '33'], ['49', '33'], ['49', '42'], ['40', '49'], ['40', '42']] -----Length: 15

['40', '42', '39'], ['40', '49', '39'], ['40', '49', '33'], ['40', '49', '42']] -----Length: 4

[] -----Length: 0

**Execution Time: 0:00:16.797597**

**No of Candidate sets: 10204**

**No of frequent sets: 31**

Rule 1 ] ['66'] ==> ['49'] conf: 0.6094808126410836 support: 0.030626134301270418 lift: 1.2762904618156277

Rule 2 ] ['49'] ==> ['66'] conf: 0.06413301662707839 support: 0.030626134301270418 lift: 1.2762904618156279

Rule 3 ] ['39'] ==> ['42'] conf: 0.2393056416615003 support: 0.04378402903811252 lift: 1.399945943522088

Rule 4 ] ['42'] ==> ['39'] conf: 0.2561380225613802 support: 0.04378402903811252 lift: 1.3999459435220878

Rule 5 ] ['37'] ==> ['39'] conf: 0.9603960396039604 support: 0.033008166969147004 lift: 5.24913297281371

Rule 6 ] ['39'] ==> ['37'] conf: 0.18040917544947302 support: 0.033008166969147004 lift: 5.24913297281371

Rule 7 ] ['66'] ==> ['40'] conf: 0.6343115124153499 support: 0.03187386569872958 lift: 1.1040652109484155

Rule 8 ] ['40'] ==> ['66'] conf: 0.055478775913129316 support: 0.03187386569872958 lift: 1.1040652109484155  
 Rule 9 ] ['39'] ==> ['111'] conf: 0.1754494730316181 support: 0.03210072595281307 lift: 5.3707033133567545  
 Rule 10 ] ['111'] ==> ['39'] conf: 0.9826388888888891 support: 0.03210072595281307 lift: 5.3707033133567545  
 Rule 11 ] ['39'] ==> ['171'] conf: 0.1791692498450093 support: 0.03278130671506352 lift: 5.3544274801139045  
 Rule 12 ] ['171'] ==> ['39'] conf: 0.9796610169491524 support: 0.03278130671506352 lift: 5.3544274801139045  
 Rule 13 ] ['39'] ==> ['40'] conf: 0.652820830750155 support: 0.11944192377495463 lift: 1.1362820224863506  
 Rule 14 ] ['40'] ==> ['39'] conf: 0.2078973346495558 support: 0.11944192377495463 lift: 1.1362820224863508  
 Rule 15 ] ['39'] ==> ['49'] conf: 0.49287042777433354 support: 0.09017695099818512 lift: 1.0321011143131888  
 Rule 16 ] ['49'] ==> ['39'] conf: 0.18883610451306415 support: 0.09017695099818512 lift: 1.0321011143131888  
 Rule 17 ] ['39'] ==> ['33'] conf: 0.18226906385616862 support: 0.03334845735027223 lift: 1.0261073224495418  
 Rule 18 ] ['33'] ==> ['39'] conf: 0.18773946360153257 support: 0.03334845735027223 lift: 1.0261073224495418  
 Rule 19 ] ['33'] ==> ['42'] conf: 0.20881226053639845 support: 0.03709165154264973 lift: 1.2215586522155863  
 Rule 20 ] ['42'] ==> ['33'] conf: 0.2169873921698739 support: 0.03709165154264973 lift: 1.2215586522155863  
 Rule 21 ] ['33'] ==> ['40'] conf: 0.5478927203065134 support: 0.09732304900181488 lift: 0.9536470330152462  
 Rule 22 ] ['40'] ==> ['33'] conf: 0.16939782823297136 support: 0.09732304900181488 lift: 0.9536470330152462  
 Rule 23 ] ['33'] ==> ['49'] conf: 0.5159642401021712 support: 0.09165154264972777 lift: 1.0804609835488699  
 Rule 24 ] ['49'] ==> ['33'] conf: 0.19192399049881237 support: 0.09165154264972777 lift: 1.0804609835488697  
 Rule 25 ] ['42'] ==> ['49'] conf: 0.6018579960185799 support: 0.10288112522686026 lift: 1.2603278130403328  
 Rule 26 ] ['49'] ==> ['42'] conf: 0.2154394299287411 support: 0.10288112522686026 lift: 1.2603278130403328  
 Rule 27 ] ['49'] ==> ['40'] conf: 0.684560570071259 support: 0.3269056261343013 lift: 1.1915273417074472  
 Rule 28 ] ['40'] ==> ['49'] conf: 0.5690029615004937 support: 0.3269056261343013 lift: 1.1915273417074472  
 Rule 29 ] ['42'] ==> ['40'] conf: 0.7637690776376906 support: 0.13055807622504537 lift: 1.3293954962396606  
 Rule 30 ] ['40'] ==> ['42'] conf: 0.2272458045409674 support: 0.13055807622504537 lift: 1.3293954962396606  
 Rule 31 ] ['39'] ==> ['40', '42'] conf: 0.1847489150650961 support: 0.033802177858439204 lift: 1.4150707517062444  
 Rule 32 ] ['40', '42'] ==> ['39'] conf: 1.4013900955690706 support: 0.033802177858439204 lift: 7.6594265855777595  
 Rule 33 ] ['42'] ==> ['40', '39'] conf: 0.19774386197743862 support: 0.033802177858439204 lift: 1.655564945102658  
 Rule 34 ] ['40', '39'] ==> ['42'] conf: 1.4311490978157646 support: 0.033802177858439204 lift: 8.372269705603038  
 Rule 35 ] ['40'] ==> ['42', '39'] conf: 0.05883514313919053 support: 0.033802177858439204 lift: 1.343758087862963  
 Rule 36 ] ['42', '39'] ==> ['40'] conf: 13.121761658031089 support: 0.033802177858439204 lift: 22.83937823834197  
 Rule 37 ] ['39'] ==> ['40', '49'] conf: 0.3688778673279603 support: 0.06749092558983666 lift: 1.128392532395315  
 Rule 38 ] ['40', '49'] ==> ['39'] conf: 0.5596807772380291 support: 0.06749092558983666 lift: 3.0589868147120054  
 Rule 39 ] ['49'] ==> ['40', '39'] conf: 0.14133016627078385 support: 0.06749092558983666 lift: 1.1832542695567239  
 Rule 40 ] ['40', '39'] ==> ['49'] conf: 3.998100664767331 support: 0.06749092558983666 lift: 8.372269705603038  
 Rule 41 ] ['40'] ==> ['49', '39'] conf: 0.11747285291214216 support: 0.06749092558983666 lift: 1.3026926682684845  
 Rule 42 ] ['49', '39'] ==> ['40'] conf: 6.371069182389936 support: 0.06749092558983666 lift: 11.089308176100628  
 Rule 43 ] ['33'] ==> ['40', '49'] conf: 0.35312899106002554 support: 0.06272686025408349 lift: 1.0802169275451716  
 Rule 44 ] ['40', '49'] ==> ['33'] conf: 0.5433726578764746 support: 0.06272686025408349 lift: 3.0589868147120054  
 Rule 45 ] ['49'] ==> ['40', '33'] conf: 0.131353919239905 support: 0.06272686025408349 lift: 1.3496691748473224  
 Rule 46 ] ['40', '33'] ==> ['49'] conf: 4.906759906759907 support: 0.06272686025408349 lift: 10.275058275058276  
 Rule 47 ] ['40'] ==> ['49', '33'] conf: 0.10918065153010859 support: 0.06272686025408349 lift: 1.1912581978829668  
 Rule 48 ] ['49', '33'] ==> ['40'] conf: 6.268564356435643 support: 0.06272686025408349 lift: 10.91089108910891  
 Rule 49 ] ['42'] ==> ['40', '49'] conf: 0.4930325149303251 support: 0.08427858439201452 lift: 1.5081799623961645  
 Rule 50 ] ['40', '49'] ==> ['42'] conf: 0.5229007633587787 support: 0.08427858439201452 lift: 3.0589868147120054  
 Rule 51 ] ['49'] ==> ['40', '42'] conf: 0.17648456057007128 support: 0.08427858439201452 lift: 1.3517705351744123

Rule 52 ] ['40', '42'] ==> ['49'] conf: 3.6576889661164205 support: 0.08427858439201452 lift: 7.659426585577759  
Rule 53 ] ['40'] ==> ['49', '42'] conf: 0.14669299111549852 support: 0.08427858439201452 lift: 1.4258494042714829  
Rule 54 ] ['49', '42'] ==> ['40'] conf: 5.584343991179713 support: 0.08427858439201452 lift: 9.719955898566703  
-----FOR 0.03 MIN SUPPORT threshold-----  
-----FOR 0.2 SAMPLE DATA-----  
Frequent set  
[['171'], ['66'], ['238'], ['111'], ['226'], ['37'], ['33'], ['42'], ['90'], ['39'], ['49'], ['40']] -----Length: 12  
[['49', '90'], ['171', '39'], ['40', '66'], ['33', '39'], ['111', '39'], ['40', '39'], ['42', '39'], ['42', '33'], ['40', '33'], ['49', '33'], ['40', '42'], ['49', '42'], ['40', '90'], ['49', '39'], ['40', '49']] -----Length: 15  
[['40', '49', '39'], ['40', '42', '39'], ['40', '49', '33'], ['40', '49', '42']] -----Length: 4  
[] -----Length: 0  
**Execution Time: 0:00:38.261351**  
**No of Candidate sets: 12415**  
**No of frequent sets: 31**  
Rule 1 ] ['90'] ==> ['49'] conf: 0.7350649350649351 support: 0.03210072595281307 lift: 1.5639754959653598  
Rule 2 ] ['49'] ==> ['90'] conf: 0.06829974659104622 support: 0.03210072595281307 lift: 1.5639754959653598  
Rule 3 ] ['39'] ==> ['171'] conf: 0.1927437641723356 support: 0.03374546279491833 lift: 5.562124467899545  
Rule 4 ] ['171'] ==> ['39'] conf: 0.9738134206219313 support: 0.03374546279491833 lift: 5.562124467899544  
Rule 5 ] ['66'] ==> ['40'] conf: 0.6271186440677966 support: 0.031476860254083486 lift: 1.091437758582903  
Rule 6 ] ['40'] ==> ['66'] conf: 0.05478235119928931 support: 0.031476860254083486 lift: 1.091437758582903  
Rule 7 ] ['39'] ==> ['33'] conf: 0.1810819565921607 support: 0.03170372050816697 lift: 1.0537416035092335  
Rule 8 ] ['33'] ==> ['39'] conf: 0.18448844884488452 support: 0.03170372050816697 lift: 1.0537416035092335  
Rule 9 ] ['39'] ==> ['111'] conf: 0.1746031746031746 support: 0.030569419237749546 lift: 5.567094348287838  
Rule 10 ] ['111'] ==> ['39'] conf: 0.9746835443037974 support: 0.030569419237749546 lift: 5.567094348287839  
Rule 11 ] ['39'] ==> ['40'] conf: 0.6608357628765792 support: 0.11569872958257713 lift: 1.1501190574513713  
Rule 12 ] ['40'] ==> ['39'] conf: 0.20136215575954988 support: 0.11569872958257713 lift: 1.1501190574513713  
Rule 13 ] ['39'] ==> ['42'] conf: 0.23679948169744086 support: 0.041458711433756804 lift: 1.4254859888321192  
Rule 14 ] ['42'] ==> ['39'] conf: 0.2495732331853875 support: 0.041458711433756804 lift: 1.4254859888321192  
Rule 15 ] ['33'] ==> ['42'] conf: 0.2099009900990092 support: 0.03607078039927405 lift: 1.263562395843545  
Rule 16 ] ['42'] ==> ['33'] conf: 0.21713895527483784 support: 0.03607078039927405 lift: 1.263562395843545  
Rule 17 ] ['33'] ==> ['40'] conf: 0.5636963696369638 support: 0.09686932849364792 lift: 0.9810575845858203  
Rule 18 ] ['40'] ==> ['33'] conf: 0.16859145197907413 support: 0.09686932849364792 lift: 0.9810575845858203  
Rule 19 ] ['33'] ==> ['49'] conf: 0.522772272272228 support: 0.08983666061705989 lift: 1.112286809711501  
Rule 20 ] ['49'] ==> ['33'] conf: 0.1911427537106311 support: 0.08983666061705989 lift: 1.112286809711501  
Rule 21 ] ['42'] ==> ['40'] conf: 0.7572550358484125 support: 0.1257940108892922 lift: 1.31792723246266  
Rule 22 ] ['40'] ==> ['42'] conf: 0.21893199091896162 support: 0.1257940108892922 lift: 1.31792723246266  
Rule 23 ] ['42'] ==> ['49'] conf: 0.605667463298054 support: 0.10061252268602541 lift: 1.288660397353842  
Rule 24 ] ['49'] ==> ['42'] conf: 0.21407023048147703 support: 0.10061252268602541 lift: 1.288660397353842  
Rule 25 ] ['90'] ==> ['40'] conf: 0.7064935064935065 support: 0.030852994555353903 lift: 1.2295818286934663  
Rule 26 ] ['40'] ==> ['90'] conf: 0.05369657486921331 support: 0.030852994555353903 lift: 1.2295818286934663  
Rule 27 ] ['39'] ==> ['49'] conf: 0.4991901522513767 support: 0.08739791288566243 lift: 1.0621118335340018  
Rule 28 ] ['49'] ==> ['39'] conf: 0.18595390370459755 support: 0.08739791288566243 lift: 1.0621118335340018  
Rule 29 ] ['49'] ==> ['40'] conf: 0.6912030891758175 support: 0.3248638838475499 lift: 1.202970374923306  
Rule 30 ] ['40'] ==> ['49'] conf: 0.5653933471523047 support: 0.3248638838475499 lift: 1.202970374923306

Rule 31 ] ['39'] ==> ['40', '49'] conf: 0.38289601554907676 support: 0.06703720508166969 lift: 1.178635221047717  
Rule 32 ] ['40', '49'] ==> ['39'] conf: 0.5389315642458101 support: 0.06703720508166969 lift: 3.0782122905027935  
Rule 33 ] ['49'] ==> ['40', '39'] conf: 0.1426330397007361 support: 0.06703720508166969 lift: 1.2327969392173426  
Rule 34 ] ['40', '39'] ==> ['49'] conf: 4.0622549019607845 support: 0.06703720508166969 lift: 8.643137254901962  
Rule 35 ] ['40'] ==> ['49', '39'] conf: 0.11667160201362155 support: 0.06703720508166969 lift: 1.3349472334225667  
Rule 36 ] ['49', '39'] ==> ['40'] conf: 6.574302401038287 support: 0.06703720508166969 lift: 11.441920830629462  
Rule 37 ] ['39'] ==> ['40', '42'] conf: 0.18367346938775508 support: 0.032157441016333936 lift: 1.4601129901915677  
Rule 38 ] ['40', '42'] ==> ['39'] conf: 1.3917944093778178 support: 0.032157441016333936 lift: 7.949504057709648  
Rule 39 ] ['42'] ==> ['40', '39'] conf: 0.19358142710822804 support: 0.032157441016333936 lift: 1.6731508444962142  
Rule 40 ] ['40', '39'] ==> ['42'] conf: 1.4357843137254902 support: 0.032157441016333936 lift: 8.64313725490196  
Rule 41 ] ['40'] ==> ['42', '39'] conf: 0.05596683446846313 support: 0.032157441016333936 lift: 1.3499414847441067  
Rule 42 ] ['42', '39'] ==> ['40'] conf: 13.859097127222983 support: 0.032157441016333936 lift: 24.120383036935703  
Rule 43 ] ['33'] ==> ['40', '49'] conf: 0.34752475247524756 support: 0.05972096188747732 lift: 1.0697549643232482  
Rule 44 ] ['40', '49'] ==> ['33'] conf: 0.5289804469273743 support: 0.05972096188747732 lift: 3.0782122905027935  
Rule 45 ] ['49'] ==> ['40', '33'] conf: 0.12706648968263545 support: 0.05972096188747732 lift: 1.311730881782335  
Rule 46 ] ['40', '33'] ==> ['49'] conf: 4.851873536299766 support: 0.05972096188747732 lift: 10.323185011709603  
Rule 47 ] ['40'] ==> ['49', '33'] conf: 0.10393840687000297 support: 0.05972096188747732 lift: 1.1569709532398311  
Rule 48 ] ['49', '33'] ==> ['40'] conf: 6.395833333333334 support: 0.05972096188747732 lift: 11.131313131313131  
Rule 49 ] ['42'] ==> ['40', '49'] conf: 0.4878798224650051 support: 0.08104582577132487 lift: 1.5017976658000995  
Rule 50 ] ['40', '49'] ==> ['42'] conf: 0.5113477653631285 support: 0.08104582577132487 lift: 3.0782122905027935  
Rule 51 ] ['49'] ==> ['40', '42'] conf: 0.17243875950283577 support: 0.08104582577132487 lift: 1.370802618374211  
Rule 52 ] ['40', '42'] ==> ['49'] conf: 3.7362488728584307 support: 0.08104582577132487 lift: 7.949504057709648  
Rule 53 ] ['40'] ==> ['49', '42'] conf: 0.14105221597078274 support: 0.08104582577132487 lift: 1.401934989851658  
Rule 54 ] ['49', '42'] ==> ['40'] conf: 5.7108229988726045 support: 0.08104582577132487 lift: 9.9391206313416

-----FOR 0.03 MIN SUPPORT threshold-----

-----FOR 0.3 SAMPLE DATA-----

Frequent set

[['311'], ['111'], ['226'], ['238'], ['66'], ['171'], ['39'], ['37'], ['49'], ['40'], ['90'], ['33'], ['42']] -----Length: 13

[['42', '39'], ['49', '39'], ['42', '33'], ['49', '42'], ['40', '42'], ['40', '66'], ['171', '39'], ['49', '33'], ['40', '33'], ['33', '39'], ['40', '39'], ['37', '39'], ['49', '90'], ['40', '49']] -----Length: 14

[['40', '42', '39'], ['40', '49', '39'], ['40', '49', '42'], ['40', '49', '33']] -----Length: 4

[] -----Length: 0

**Execution Time: 0:01:04.291521**

**No of Candidate sets: 13534**

**No of frequent sets: 31**

Rule 1 ] ['39'] ==> ['42'] conf: 0.2523892267593397 support: 0.043935269207501515 lift: 1.5160550236954389  
Rule 2 ] ['42'] ==> ['39'] conf: 0.26391096979332274 support: 0.043935269207501515 lift: 1.5160550236954387  
Rule 3 ] ['39'] ==> ['49'] conf: 0.5241094700260643 support: 0.09123563218390805 lift: 1.09198418648569  
Rule 4 ] ['49'] ==> ['39'] conf: 0.1900898062076572 support: 0.09123563218390805 lift: 1.09198418648569  
Rule 5 ] ['33'] ==> ['42'] conf: 0.21517302573203195 support: 0.036675741076830005 lift: 1.2925042435977245  
Rule 6 ] ['42'] ==> ['33'] conf: 0.22030433795139678 support: 0.036675741076830005 lift: 1.2925042435977245  
Rule 7 ] ['42'] ==> ['49'] conf: 0.6045877810583693 support: 0.10065033272837265 lift: 1.2596610708548726  
Rule 8 ] ['49'] ==> ['42'] conf: 0.2097053726169844 support: 0.10065033272837265 lift: 1.2596610708548726  
Rule 9 ] ['42'] ==> ['40'] conf: 0.761071996366114 support: 0.12670145190562612 lift: 1.334803193626723

Rule 10 ] ['40'] ==> ['42'] conf: 0.22221485411140582 support: 0.12670145190562612 lift: 1.334803193626723  
 Rule 11 ] ['66'] ==> ['40'] conf: 0.607275426874536 support: 0.030928614640048396 lift: 1.065067671749186  
 Rule 12 ] ['40'] ==> ['66'] conf: 0.05424403183023872 support: 0.030928614640048396 lift: 1.065067671749186  
 Rule 13 ] ['39'] ==> ['171'] conf: 0.19178974804517812 support: 0.03338626739261948 lift: 5.574126655273484  
 Rule 14 ] ['171'] ==> ['39'] conf: 0.9703296703296703 support: 0.03338626739261948 lift: 5.574126655273484  
 Rule 15 ] ['33'] ==> ['49'] conf: 0.5337178349600711 support: 0.09097096188747732 lift: 1.1120032534287034  
 Rule 16 ] ['49'] ==> ['33'] conf: 0.18953836458169215 support: 0.09097096188747732 lift: 1.1120032534287032  
 Rule 17 ] ['33'] ==> ['40'] conf: 0.5649955634427685 support: 0.0963021778584392 lift: 0.9909152958842401  
 Rule 18 ] ['40'] ==> ['33'] conf: 0.16889920424403182 support: 0.0963021778584392 lift: 0.99091529588424  
 Rule 19 ] ['39'] ==> ['33'] conf: 0.18158123370981755 support: 0.031609195402298854 lift: 1.065319536192825  
 Rule 20 ] ['33'] ==> ['39'] conf: 0.18544809228039044 support: 0.031609195402298854 lift: 1.065319536192825  
 Rule 21 ] ['39'] ==> ['40'] conf: 0.6624674196350998 support: 0.11532062915910465 lift: 1.1618659359754058  
 Rule 22 ] ['40'] ==> ['39'] conf: 0.20225464190981432 support: 0.11532062915910465 lift: 1.161865935975406  
 Rule 23 ] ['39'] ==> ['37'] conf: 0.17767158992180712 support: 0.030928614640048396 lift: 5.426164215071541  
 Rule 24 ] ['37'] ==> ['39'] conf: 0.9445727482678983 support: 0.030928614640048396 lift: 5.42616421507154  
 Rule 25 ] ['90'] ==> ['49'] conf: 0.7415929203539824 support: 0.03168481548699335 lift: 1.5451118290154504  
 Rule 26 ] ['49'] ==> ['90'] conf: 0.06601544036552702 support: 0.03168481548699335 lift: 1.5451118290154502  
 Rule 27 ] ['49'] ==> ['40'] conf: 0.6868599338270049 support: 0.32966575922565033 lift: 1.2046466531735163  
 Rule 28 ] ['40'] ==> ['49'] conf: 0.5781830238726791 support: 0.32966575922565033 lift: 1.2046466531735163  
 Rule 29 ] ['39'] ==> ['40', '42'] conf: 0.19569939183318852 support: 0.03406684815486993 lift: 1.5445710281122562  
 Rule 30 ] ['40', '42'] ==> ['39'] conf: 1.3739182333631754 support: 0.03406684815486993 lift: 7.892569382273949  
 Rule 31 ] ['42'] ==> ['40', '39'] conf: 0.20463320463320464 support: 0.03406684815486993 lift: 1.7744718020127856  
 Rule 32 ] ['40', '39'] ==> ['42'] conf: 1.4436065573770491 support: 0.03406684815486993 lift: 8.671475409836066  
 Rule 33 ] ['40'] ==> ['42', '39'] conf: 0.059748010610079574 support: 0.03406684815486993 lift: 1.3599099695485237  
 Rule 34 ] ['42', '39'] ==> ['40'] conf: 12.977624784853699 support: 0.03406684815486993 lift: 22.760757314974178  
 Rule 35 ] ['39'] ==> ['40', '49'] conf: 0.3994352736750651 support: 0.06953266787658802 lift: 1.211637127899773  
 Rule 36 ] ['40', '49'] ==> ['39'] conf: 0.5280422066750774 support: 0.06953266787658802 lift: 3.0333753870856746  
 Rule 37 ] ['49'] ==> ['40', '39'] conf: 0.14487159287852527 support: 0.06953266787658802 lift: 1.2562504552299136  
 Rule 38 ] ['40', '39'] ==> ['49'] conf: 4.161967213114754 support: 0.06953266787658802 lift: 8.671475409836066  
 Rule 39 ] ['40'] ==> ['49', '39'] conf: 0.1219496021220159 support: 0.06953266787658802 lift: 1.3366444579043002  
 Rule 40 ] ['49', '39'] ==> ['40'] conf: 6.249481972648155 support: 0.06953266787658802 lift: 10.96062992125984  
 Rule 41 ] ['42'] ==> ['40', '49'] conf: 0.49307290483761074 support: 0.08208560193587416 lift: 1.4956752135732456  
 Rule 42 ] ['40', '49'] ==> ['42'] conf: 0.5049891042550751 support: 0.08208560193587416 lift: 3.0333753870856754  
 Rule 43 ] ['49'] ==> ['40', '42'] conf: 0.17102568142429495 support: 0.08208560193587416 lift: 1.3498320567919286  
 Rule 44 ] ['40', '42'] ==> ['49'] conf: 3.78812294837362 support: 0.08208560193587416 lift: 7.892569382273949  
 Rule 45 ] ['40'] ==> ['49', '42'] conf: 0.1439655172413793 support: 0.08208560193587416 lift: 1.4303531179564237  
 Rule 46 ] ['49', '42'] ==> ['40'] conf: 5.664913598797897 support: 0.08208560193587416 lift: 9.935386927122465  
 Rule 47 ] ['33'] ==> ['40', '49'] conf: 0.3604702750665484 support: 0.06144131881427707 lift: 1.093441660162871  
 Rule 48 ] ['40', '49'] ==> ['33'] conf: 0.5170317696983598 support: 0.06144131881427707 lift: 3.0333753870856746  
 Rule 49 ] ['49'] ==> ['40', '33'] conf: 0.12801323459902317 support: 0.06144131881427707 lift: 1.329287015577136  
 Rule 50 ] ['40', '33'] ==> ['49'] conf: 4.98390263054574 support: 0.06144131881427707 lift: 10.383981154299175  
 Rule 51 ] ['40'] ==> ['49', '33'] conf: 0.10775862068965517 support: 0.06144131881427707 lift: 1.1845386533665834  
 Rule 52 ] ['49', '33'] ==> ['40'] conf: 6.26766417290108 support: 0.06144131881427707 lift: 10.992518703241894  
 -----FOR 0.05 MIN SUPPORT threshold-----



-----FOR 0.1 SAMPLE DATA-----

Frequent set:

['66'], ['42'], ['39'], ['33'], ['49'], ['40']] -----Length: 6

['49', '39'], ['49', '33'], ['49', '42'], ['40', '39'], ['40', '42'], ['40', '33'], ['40', '49']] -----Length: 7

['40', '49', '39'], ['40', '49', '33'], ['40', '49', '42']] -----Length: 3

[] -----Length: 0

**Execution Time: 0:00:20.286270**

**No of Candidate sets: 10226**

**No of frequent sets: 16**

Rule 1 ] ['39'] ==> ['49'] conf: 0.5095628415300546 support: 0.08461887477313974 lift: 1.064023214336561

Rule 2 ] ['49'] ==> ['39'] conf: 0.17669351018474655 support: 0.08461887477313974 lift: 1.064023214336561

Rule 3 ] ['33'] ==> ['49'] conf: 0.5416393442622951 support: 0.09369328493647913 lift: 1.131002477265844

Rule 4 ] ['49'] ==> ['33'] conf: 0.19564187588820464 support: 0.09369328493647913 lift: 1.131002477265844

Rule 5 ] ['42'] ==> ['49'] conf: 0.5955213435969209 support: 0.09652903811252268 lift: 1.2435140135363463

Rule 6 ] ['49'] ==> ['42'] conf: 0.20156324017053528 support: 0.09652903811252268 lift: 1.2435140135363465

Rule 7 ] ['39'] ==> ['40'] conf: 0.6557377049180327 support: 0.1088929219600726 lift: 1.1571224192468728

Rule 8 ] ['40'] ==> ['39'] conf: 0.19215372297838268 support: 0.1088929219600726 lift: 1.1571224192468728

Rule 9 ] ['42'] ==> ['40'] conf: 0.755073477956613 support: 0.12239110707803992 lift: 1.332411485521517

Rule 10 ] ['40'] ==> ['42'] conf: 0.21597277822257804 support: 0.12239110707803992 lift: 1.3324114855215172

Rule 11 ] ['33'] ==> ['40'] conf: 0.5429508196721311 support: 0.09392014519056262 lift: 0.9580973631364106

Rule 12 ] ['40'] ==> ['33'] conf: 0.16573258606885508 support: 0.09392014519056262 lift: 0.9580973631364107

Rule 13 ] ['49'] ==> ['40'] conf: 0.6932733301752724 support: 0.3320099818511797 lift: 1.2233582223429145

Rule 14 ] ['40'] ==> ['49'] conf: 0.5858686949559647 support: 0.3320099818511797 lift: 1.2233582223429145

Rule 15 ] ['39'] ==> ['40', '49'] conf: 0.39480874316939885 support: 0.06556261343012704 lift: 1.1891472086714794

Rule 16 ] ['40', '49'] ==> ['39'] conf: 0.5001708233686368 support: 0.06556261343012704 lift: 3.011957635804578

Rule 17 ] ['49'] ==> ['40', '39'] conf: 0.13690194220748458 support: 0.06556261343012704 lift: 1.2572161692720667

Rule 18 ] ['40', '39'] ==> ['49'] conf: 4.397916666666667 support: 0.06556261343012704 lift: 9.183333333333334

Rule 19 ] ['40'] ==> ['49', '39'] conf: 0.11569255404323457 support: 0.06556261343012704 lift: 1.3672192445645523

Rule 20 ] ['49', '39'] ==> ['40'] conf: 6.697050938337802 support: 0.06556261343012704 lift: 11.817694369973191

Rule 21 ] ['33'] ==> ['40', '49'] conf: 0.35147540983606557 support: 0.060798548094373864 lift: 1.058629044453281

Rule 22 ] ['40', '49'] ==> ['33'] conf: 0.5210112743423301 support: 0.060798548094373864 lift: 3.011957635804578

Rule 23 ] ['49'] ==> ['40', '33'] conf: 0.1269540502131691 support: 0.060798548094373864 lift: 1.3517233172455299

Rule 24 ] ['40', '33'] ==> ['49'] conf: 5.099033816425121 support: 0.060798548094373864 lift: 10.647342995169081

Rule 25 ] ['40'] ==> ['49', '33'] conf: 0.10728582866293034 support: 0.060798548094373864 lift: 1.1450748976905494

Rule 26 ] ['49', '33'] ==> ['40'] conf: 6.048426150121066 support: 0.060798548094373864 lift: 10.673123486682808

Rule 27 ] ['42'] ==> ['40', '49'] conf: 0.48285514345696295 support: 0.07826678765880218 lift: 1.4543392363227143

Rule 28 ] ['40', '49'] ==> ['42'] conf: 0.48821318756405874 support: 0.07826678765880218 lift: 3.0119576358045776

Rule 29 ] ['49'] ==> ['40', '42'] conf: 0.1634296541923259 support: 0.07826678765880218 lift: 1.3353066092303478

Rule 30 ] ['40', '42'] ==> ['49'] conf: 3.9128822984244676 support: 0.07826678765880218 lift: 8.17052826691381

Rule 31 ] ['40'] ==> ['49', '42'] conf: 0.13811048839071258 support: 0.07826678765880218 lift: 1.430766234609309

Rule 32 ] ['49', '42'] ==> ['40'] conf: 5.870740305522915 support: 0.07826678765880218 lift: 10.359576968272622

-----FOR 0.05 MIN SUPPORT threshold-----

-----FOR 0.2 SAMPLE DATA-----

Frequent set:

```

[['66'], ['33'], ['42'], ['39'], ['49'], ['40']] -----Length: 6
[['40', '33'], ['49', '33'], ['40', '39'], ['49', '39'], ['40', '42'], ['49', '42'], ['40', '49']] -----Length: 7
[['40', '49', '33'], ['40', '49', '39'], ['40', '49', '42']] -----Length: 3
[] -----Length: 0
Execution Time: 0:00:47.668165
No of Candidate sets: 12160
No of frequent sets: 16
Rule 1 ] ['33'] ==> ['40'] conf: 0.5590601866752495 support: 0.09851406533575317 lift: 0.9722210485706676
Rule 2 ] ['40'] ==> ['33'] conf: 0.1713186704803235 support: 0.09851406533575317 lift: 0.9722210485706676
Rule 3 ] ['33'] ==> ['49'] conf: 0.5230125523012553 support: 0.09216197822141561 lift: 1.1007110673401448
Rule 4 ] ['49'] ==> ['33'] conf: 0.19396037240391503 support: 0.09216197822141561 lift: 1.1007110673401448
Rule 5 ] ['39'] ==> ['40'] conf: 0.6629285485421339 support: 0.1173434664246824 lift: 1.1528509880555189
Rule 6 ] ['40'] ==> ['39'] conf: 0.20406351711214124 support: 0.1173434664246824 lift: 1.1528509880555189
Rule 7 ] ['39'] ==> ['49'] conf: 0.5040051265619994 support: 0.08921279491833031 lift: 1.0607088077752653
Rule 8 ] ['49'] ==> ['39'] conf: 0.18775364048698975 support: 0.08921279491833031 lift: 1.0607088077752653
Rule 9 ] ['42'] ==> ['40'] conf: 0.7654028436018958 support: 0.12823275862068967 lift: 1.3310566070015413
Rule 10 ] ['40'] ==> ['42'] conf: 0.22300029588716838 support: 0.12823275862068967 lift: 1.3310566070015413
Rule 11 ] ['42'] ==> ['49'] conf: 0.5809072444143534 support: 0.09732304900181488 lift: 1.2225538951436952
Rule 12 ] ['49'] ==> ['42'] conf: 0.20482215325853426 support: 0.09732304900181488 lift: 1.2225538951436954
Rule 13 ] ['49'] ==> ['40'] conf: 0.6955120553831464 support: 0.3304786751361162 lift: 1.209514603068906
Rule 14 ] ['40'] ==> ['49'] conf: 0.5747115100108492 support: 0.3304786751361162 lift: 1.209514603068906
Rule 15 ] ['33'] ==> ['40', '49'] conf: 0.3550048278081751 support: 0.06255671506352087 lift: 1.074214025040972
Rule 16 ] ['40', '49'] ==> ['33'] conf: 0.5332074824094731 support: 0.06255671506352087 lift: 3.025913849322121
Rule 17 ] ['49'] ==> ['40', '33'] conf: 0.1316543327763189 support: 0.06255671506352087 lift: 1.33640137910884
Rule 18 ] ['40', '33'] ==> ['49'] conf: 4.8232584916522745 support: 0.06255671506352087 lift: 10.150834772596431
Rule 19 ] ['40'] ==> ['49', '33'] conf: 0.10878784890028602 support: 0.06255671506352087 lift: 1.1803983703445187
Rule 20 ] ['49', '33'] ==> ['40'] conf: 6.239384615384615 support: 0.06255671506352087 lift: 10.850461538461538
Rule 21 ] ['39'] ==> ['40', '49'] conf: 0.3844921499519384 support: 0.06805807622504537 lift: 1.1634401214952081
Rule 22 ] ['40', '49'] ==> ['39'] conf: 0.535610090955895 support: 0.06805807622504537 lift: 3.025913849322121
Rule 23 ] ['49'] ==> ['40', '39'] conf: 0.143232275005968 support: 0.06805807622504537 lift: 1.220624201500835
Rule 24 ] ['40', '39'] ==> ['49'] conf: 4.049299178347027 support: 0.06805807622504537 lift: 8.521991300144997
Rule 25 ] ['40'] ==> ['49', '39'] conf: 0.1183548673439195 support: 0.06805807622504537 lift: 1.3266579917406158
Rule 26 ] ['49', '39'] ==> ['40'] conf: 6.445645263827082 support: 0.06805807622504537 lift: 11.209154481881754
Rule 27 ] ['42'] ==> ['40', '49'] conf: 0.47596479350033855 support: 0.07974137931034483 lift: 1.4402284604424178
Rule 28 ] ['40', '49'] ==> ['42'] conf: 0.506950403295006 support: 0.07974137931034483 lift: 3.0259138493221207
Rule 29 ] ['49'] ==> ['40', '42'] conf: 0.16782048221532586 support: 0.07974137931034483 lift: 1.3087177100489276
Rule 30 ] ['40', '42'] ==> ['49'] conf: 3.705440070765148 support: 0.07974137931034483 lift: 7.798319327731091
Rule 31 ] ['40'] ==> ['49', '42'] conf: 0.1386724529046257 support: 0.07974137931034483 lift: 1.4248675347403035
Rule 32 ] ['49', '42'] ==> ['40'] conf: 5.908508158508159 support: 0.07974137931034483 lift: 10.275058275058276
-----FOR 0.05 MIN SUPPORT threshold-----
-----FOR 0.3 SAMPLE DATA-----
Frequent set:
[['39'], ['66'], ['33'], ['49'], ['42'], ['40']] -----Length: 6
[['49', '33'], ['40', '39'], ['49', '39'], ['40', '33'], ['49', '42'], ['40', '49'], ['40', '42']] -----Length: 7

```

[[ '40', '49', '33'], [ '40', '49', '39'], [ '40', '49', '42']] -----Length: 3

[] -----Length: 0

**Execution Time: 0:01:09.665047**

**No of Candidate sets: 13469**

**No of frequent sets: 16**

Rule 1 ] [ '33' ] ==> [ '49' ] conf: 0.5264886164623468 support: 0.09093315184513007 lift: 1.1033732906653049  
Rule 2 ] [ '49' ] ==> [ '33' ] conf: 0.19057052297939778 support: 0.09093315184513007 lift: 1.1033732906653049  
Rule 3 ] [ '39' ] ==> [ '40' ] conf: 0.6698924731182797 support: 0.11777828191167575 lift: 1.1627061378811039  
Rule 4 ] [ '40' ] ==> [ '39' ] conf: 0.20442315264470404 support: 0.11777828191167575 lift: 1.1627061378811039  
Rule 5 ] [ '39' ] ==> [ '49' ] conf: 0.5075268817204301 support: 0.08923169993950393 lift: 1.0636347834977764  
Rule 6 ] [ '49' ] ==> [ '39' ] conf: 0.18700475435816166 support: 0.08923169993950393 lift: 1.0636347834977764  
Rule 7 ] [ '33' ] ==> [ '40' ] conf: 0.5612959719789842 support: 0.0969449485783424 lift: 0.9742194426368403  
Rule 8 ] [ '40' ] ==> [ '33' ] conf: 0.16826355164719778 support: 0.0969449485783424 lift: 0.9742194426368403  
Rule 9 ] [ '42' ] ==> [ '49' ] conf: 0.6052573448199691 support: 0.10359951603145795 lift: 1.268450574944417  
Rule 10 ] [ '49' ] ==> [ '42' ] conf: 0.21711568938193343 support: 0.10359951603145795 lift: 1.2684505749444168  
Rule 11 ] [ '49' ] ==> [ '40' ] conf: 0.6916798732171157 support: 0.3300438596491228 lift: 1.2005216752097567  
Rule 12 ] [ '40' ] ==> [ '49' ] conf: 0.572844205276283 support: 0.3300438596491228 lift: 1.200521675209757  
Rule 13 ] [ '42' ] ==> [ '40' ] conf: 0.7572343715484868 support: 0.1296128251663642 lift: 1.3143020513659522  
Rule 14 ] [ '40' ] ==> [ '42' ] conf: 0.22496390602441263 support: 0.1296128251663642 lift: 1.3143020513659522  
Rule 15 ] [ '33' ] ==> [ '40', '49' ] conf: 0.3533274956217163 support: 0.06102540834845735 lift: 1.0705470963687882  
Rule 16 ] [ '40', '49' ] ==> [ '33' ] conf: 0.5233130942834231 support: 0.06102540834845735 lift: 3.0299003322259135  
Rule 17 ] [ '49' ] ==> [ '40', '33' ] conf: 0.12789223454833598 support: 0.06102540834845735 lift: 1.3192253585547544  
Rule 18 ] [ '40', '33' ] ==> [ '49' ] conf: 4.921996879875195 support: 0.06102540834845735 lift: 10.315132605304212  
Rule 19 ] [ '40' ] ==> [ '49', '33' ] conf: 0.10591941199632497 support: 0.06102540834845735 lift: 1.164805242610729  
Rule 20 ] [ '49', '33' ] ==> [ '40' ] conf: 6.335966735966736 support: 0.06102540834845735 lift: 10.997089397089397  
Rule 21 ] [ '39' ] ==> [ '40', '49' ] conf: 0.39440860215053763 support: 0.06934361766485178 lift: 1.1950187546886721  
Rule 22 ] [ '40', '49' ] ==> [ '39' ] conf: 0.5327070683927139 support: 0.06934361766485178 lift: 3.0299003322259135  
Rule 23 ] [ '49' ] ==> [ '40', '39' ] conf: 0.14532488114104597 support: 0.06934361766485178 lift: 1.2338852187538951  
Rule 24 ] [ '40', '39' ] ==> [ '49' ] conf: 4.051364365971107 support: 0.06934361766485178 lift: 8.490529695024076  
Rule 25 ] [ '40' ] ==> [ '49', '39' ] conf: 0.12035700223126393 support: 0.06934361766485178 lift: 1.3488144046663002  
Rule 26 ] [ '49', '39' ] ==> [ '40' ] conf: 6.45677966101695 support: 0.06934361766485178 lift: 11.206779661016949  
Rule 27 ] [ '42' ] ==> [ '40', '49' ] conf: 0.49017009056770494 support: 0.08390048396854205 lift: 1.4851665202582953  
Rule 28 ] [ '40', '49' ] ==> [ '42' ] conf: 0.5186161072287776 support: 0.08390048396854205 lift: 3.0299003322259135  
Rule 29 ] [ '49' ] ==> [ '40', '42' ] conf: 0.17583201267828844 support: 0.08390048396854205 lift: 1.356594244841124  
Rule 30 ] [ '40', '42' ] ==> [ '49' ] conf: 3.6814469078179695 support: 0.08390048396854205 lift: 7.715285880980163  
Rule 31 ] [ '40' ] ==> [ '49', '42' ] conf: 0.14562278514240715 support: 0.08390048396854205 lift: 1.4056319056373665  
Rule 32 ] [ '49', '42' ] ==> [ '40' ] conf: 5.561313868613139 support: 0.08390048396854205 lift: 9.652554744525547

2.7. Write a report about the results obtained when running your program. This report must contain the following with clear section headings:

2.7.1 A list of all the association rules generated using each algorithm on the given dataset for the case when the minimum support threshold is 1%, and a message indicating whether or not the two lists of association rules generated by the two algorithms are the same. For each association rule listed, include its **support**, **confidence**, and **lift**.

For full Data – With minimum support threshold as 1%

```
['16218'], ['16011'], ['15833'], ['14099'], ['13042'], ['12926'], ['10516'], ['3271'], ['2959'], ['2239'], ['1394'], ['1328'], ['1147'], ['1005'], ['957'], ['825'], ['784'], ['10'], ['741'], ['20'], ['678'], ['605'], ['593'], ['590'], ['549'], ['534'], ['523'], ['480'], ['476'], ['439'], ['414'], ['339'], ['311'], ['302'], ['287'], ['272'], ['271'], ['265'], ['259'], ['256'], ['250'], ['243'], ['238'], ['226'], ['202'], ['186'], ['180'], ['176'], ['171'], ['162'], ['148'], ['124'], ['118'], ['111'], ['90'], ['102'], ['80'], ['79'], ['66'], ['61'], ['50'], ['49'], ['46'], ['42'], ['40'], ['39'], ['38'], ['37'], ['33'], ['32']] length: 70
```

```
['40', '12926'], ['40', '2239'], ['2239', '49'], ['40', '414'], ['40', '1328'], ['49', '1328'], ['49', '272'], ['40', '1147'], ['40', '534'], ['49', '111'], ['49', '311'], ['49', '226'], ['271', '49'], ['476', '40'], ['476', '49'], ['40', '439'], ['49', '439'], ['49', '414'], ['42', '66'], ['61', '40'], ['40', '311'], ['287', '39'], ['238', '49'], ['271', '40'], ['40', '272'], ['40', '226'], ['40', '256'], ['49', '256'], ['49', '66'], ['238', '40'], ['40', '66'], ['33', '39'], ['40', '33'], ['49', '33'], ['171', '39'], ['171', '40'], ['171', '49'], ['40', '148'], ['49', '148'], ['111', '39'], ['40', '111'], ['40', '102'], ['49', '102'], ['40', '90'], ['49', '90'], ['49', '37'], ['49', '42'], ['80', '49'], ['80', '40'], ['42', '33'], ['49', '39'], ['40', '49'], ['37', '39'], ['38', '39'], ['40', '37'], ['40', '39'], ['42', '39'], ['40', '42']] length: 58
```

```
['40', '49', '311'], ['40', '49', '111'], ['49', '111', '39'], ['40', '49', '226'], ['476', '49', '40'], ['238', '49', '40'], ['40', '49', '66'], ['49', '33', '39'], ['40', '33', '39'], ['49', '42', '33'], ['40', '42', '33'], ['40', '49', '33'], ['171', '49', '40'], ['171', '49', '39'], ['171', '40', '39'], ['40', '111', '39'], ['40', '49', '90'], ['40', '49', '102'], ['40', '49', '42'], ['40', '49', '37'], ['49', '42', '39'], ['49', '39', '37'], ['40', '49', '39'], ['40', '42', '39'], ['40', '39', '37']] length: 25
```

```
['49', '40', '111', '39'], ['49', '33', '40', '39'], ['49', '33', '42', '40'], ['49', '40', '171', '39'], ['49', '40', '39', '37'], ['49', '42', '40', '39']] length: 6
```

[] length: 0

**Execution Time : 0:05:17.161543**

**No of Candidate sets: 19273**

**No of frequent sets: 159**

Rule 1 ] ['12926'] ==> ['40'] conf: 0.6394001363326517 support: 0.010639625231111262 lift: 1.1123858987513153

Rule 2 ] ['2239'] ==> ['40'] conf: 0.7504373177842565 support: 0.01459829176166332 lift: 1.3055610137775595

Rule 3 ] ['2239'] ==> ['49'] conf: 0.5568513119533527 support: 0.010832454259820101 lift: 1.1651256322088412

Rule 4 ] ['414'] ==> ['40'] conf: 0.601063829787234 support: 0.012817458967116979 lift: 1.0456909382905246

Rule 5 ] ['1328'] ==> ['40'] conf: 0.6472564389697648 support: 0.013112373952201087 lift: 1.1260537723929636

Rule 6 ] ['1328'] ==> ['49'] conf: 0.541993281075028 support: 0.010979911752362155 lift: 1.1340374902778105

Rule 7 ] ['272'] ==> ['49'] conf: 0.5205348615090736 support: 0.012363743605449121 lift: 1.0891390512756958

Rule 8 ] ['1147'] ==> ['40'] conf: 0.6893408134642357 support: 0.011150055012987603 lift: 1.199269372586492

Rule 9 ] ['534'] ==> ['40'] conf: 0.6200403496973773 support: 0.01045813908644412 lift: 1.0787050275218644

Rule 10 ] ['111'] ==> ['49'] conf: 0.49391553328561205 support: 0.01565317997754109 lift: 1.0334422055296748

Rule 11 ] ['311'] ==> ['49'] conf: 0.6522744795682344 support: 0.01919215979855038 lift: 1.3647839181966326

Rule 12 ] ['226'] ==> ['49'] conf: 0.5330058335891925 support: 0.01969124669638502 lift: 1.115232640205454  
 Rule 13 ] ['271'] ==> ['49'] conf: 0.5519031141868511 support: 0.010855140027903495 lift: 1.1547722902533994  
 Rule 14 ] ['476'] ==> ['40'] conf: 0.6922011998154131 support: 0.017014326062544664 lift: 1.2042456828204564  
 Rule 15 ] ['476'] ==> ['49'] conf: 0.6589755422242731 support: 0.01619763841154252 lift: 1.3788048600459035  
 Rule 16 ] ['439'] ==> ['40'] conf: 0.6763285024154589 support: 0.014292033892537517 lift: 1.1766314178875041  
 Rule 17 ] ['439'] ==> ['49'] conf: 0.5501878690284487 support: 0.011626456142738852 lift: 1.151183403854683  
 Rule 18 ] ['414'] ==> ['49'] conf: 0.6037234042553191 support: 0.01287417338732546 lift: 1.2631982684835217  
 Rule 19 ] ['66'] ==> ['42'] conf: 0.22249552772808587 support: 0.011286169621487959 lift: 1.312507743060273  
 Rule 20 ] ['42'] ==> ['66'] conf: 0.0665774506523921 support: 0.011286169621487959 lift: 1.3125077430602727  
 Rule 21 ] ['61'] ==> ['40'] conf: 0.6601746138347885 support: 0.011150055012987603 lift: 1.1485279552104348  
 Rule 22 ] ['311'] ==> ['40'] conf: 0.7139552814186584 support: 0.02100702124522181 lift: 1.2420919894454927  
 Rule 23 ] ['39'] ==> ['287'] conf: 0.07155680943831752 support: 0.01265865859053323 lift: 5.332645711658082  
 Rule 24 ] ['287'] ==> ['39'] conf: 0.9433643279797127 support: 0.01265865859053323 lift: 5.332645711658082  
 Rule 25 ] ['238'] ==> ['49'] conf: 0.5547493403693932 support: 0.019078730958133415 lift: 1.1607275803086763  
 Rule 26 ] ['271'] ==> ['40'] conf: 0.6885813148788926 support: 0.013543403545785551 lift: 1.197948047381116  
 Rule 27 ] ['272'] ==> ['40'] conf: 0.6848137535816619 support: 0.016265695715792696 lift: 1.1913934944156466  
 Rule 28 ] ['226'] ==> ['40'] conf: 0.7218299048203869 support: 0.026667120382028335 lift: 1.255791736336855  
 Rule 29 ] ['256'] ==> ['40'] conf: 0.7170963364993216 support: 0.01198942843207314 lift: 1.2475565884976159  
 Rule 30 ] ['256'] ==> ['49'] conf: 0.7170963364993216 support: 0.01198942843207314 lift: 1.5004136732435431  
 Rule 31 ] ['66'] ==> ['49'] conf: 0.5655187835420393 support: 0.0286861537414503 lift: 1.1832609819829056  
 Rule 32 ] ['49'] ==> ['66'] conf: 0.06002135991456034 support: 0.0286861537414503 lift: 1.1832609819829056  
 Rule 33 ] ['238'] ==> ['40'] conf: 0.6362137203166227 support: 0.021880423316432435 lift: 1.1068423837559698  
 Rule 34 ] ['66'] ==> ['40'] conf: 0.623211091234347 support: 0.03161261782420798 lift: 1.0842212730993837  
 Rule 35 ] ['40'] ==> ['66'] conf: 0.054997533300444004 support: 0.03161261782420798 lift: 1.0842212730993837  
 Rule 36 ] ['39'] ==> ['33'] conf: 0.18164914080533473 support: 0.03213439049012602 lift: 1.0558693151275211  
 Rule 37 ] ['33'] ==> ['39'] conf: 0.1867871035801411 support: 0.03213439049012602 lift: 1.0558693151275211  
 Rule 38 ] ['33'] ==> ['40'] conf: 0.5574602755983384 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 39 ] ['40'] ==> ['33'] conf: 0.16684755796743955 support: 0.09590408457254342 lift: 0.9698323701435642  
 Rule 40 ] ['33'] ==> ['49'] conf: 0.5297026438979363 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 41 ] ['49'] ==> ['33'] conf: 0.19067283730865078 support: 0.09112873039098922 lift: 1.1083212243665828  
 Rule 42 ] ['39'] ==> ['171'] conf: 0.1943447037701975 support: 0.03438028153038192 lift: 5.5287587702756955  
 Rule 43 ] ['171'] ==> ['39'] conf: 0.9780574378831881 support: 0.03438028153038192 lift: 5.5287587702756955  
 Rule 44 ] ['171'] ==> ['40'] conf: 0.664407873507583 support: 0.023354998241852973 lift: 1.1558926992856837  
 Rule 45 ] ['171'] ==> ['49'] conf: 0.5024201355275895 support: 0.01766087045292136 lift: 1.0512367762726431  
 Rule 46 ] ['148'] ==> ['40'] conf: 0.6391231028667791 support: 0.012896859155408854 lift: 1.1119039343233963  
 Rule 47 ] ['148'] ==> ['49'] conf: 0.5823496346261945 support: 0.011751227867197513 lift: 1.2184769464407246  
 Rule 48 ] ['39'] ==> ['111'] conf: 0.17472428827904593 support: 0.030909359013622805 lift: 5.513195411227262  
 Rule 49 ] ['111'] ==> ['39'] conf: 0.9753042233357194 support: 0.030909359013622805 lift: 5.513195411227261  
 Rule 50 ] ['111'] ==> ['40'] conf: 0.629563350035791 support: 0.01995213302934404 lift: 1.095272511149588  
 Rule 51 ] ['102'] ==> ['40'] conf: 0.6258381761287438 support: 0.015880037658375017 lift: 1.0887917009508867  
 Rule 52 ] ['102'] ==> ['49'] conf: 0.5860527492177022 support: 0.014870520978664035 lift: 1.2262251435571816  
 Rule 53 ] ['90'] ==> ['40'] conf: 0.7164451394318478 support: 0.03118158823062352 lift: 1.2464236790814234  
 Rule 54 ] ['40'] ==> ['90'] conf: 0.054247656635421804 support: 0.03118158823062352 lift: 1.2464236790814236  
 Rule 55 ] ['90'] ==> ['49'] conf: 0.729215532968465 support: 0.031737389548666645 lift: 1.5257712258700094

Rule 56 ] ['49'] ==> ['90'] conf: 0.06640560104426249 support: 0.031737389548666645 lift: 1.5257712258700094  
 Rule 57 ] ['37'] ==> ['49'] conf: 0.4822882833787473 support: 0.01606152380304216 lift: 1.0091151155831346  
 Rule 58 ] ['42'] ==> ['49'] conf: 0.6034125125460019 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 59 ] ['49'] ==> ['42'] conf: 0.2140263438946244 support: 0.1022901282880185 lift: 1.2625477754495806  
 Rule 60 ] ['80'] ==> ['49'] conf: 0.558125 support: 0.010129195449234922 lift: 1.1677906283374866  
 Rule 61 ] ['80'] ==> ['40'] conf: 0.694375 support: 0.012601944170324746 lift: 1.208027516033547  
 Rule 62 ] ['33'] ==> ['42'] conf: 0.2107206435023406 support: 0.036251857397261826 lift: 1.2430473504054766  
 Rule 63 ] ['42'] ==> ['33'] conf: 0.21385078621612577 support: 0.036251857397261826 lift: 1.2430473504054766  
 Rule 64 ] ['39'] ==> ['49'] conf: 0.5093613747114645 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 65 ] ['49'] ==> ['39'] conf: 0.1885368458526166 support: 0.09010787082723654 lift: 1.0657602505265793  
 Rule 66 ] ['49'] ==> ['40'] conf: 0.6916340334638661 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 67 ] ['40'] ==> ['49'] conf: 0.5750764676862358 support: 0.3305543267431177 lift: 1.2032589644638954  
 Rule 68 ] ['39'] ==> ['37'] conf: 0.1788920235957938 support: 0.03164664647633307 lift: 5.371696080459393  
 Rule 69 ] ['37'] ==> ['39'] conf: 0.9502724795640327 support: 0.03164664647633307 lift: 5.371696080459393  
 Rule 70 ] ['39'] ==> ['38'] conf: 0.06706847909720441 support: 0.011864656707614479 lift: 5.505422891702643  
 Rule 71 ] ['38'] ==> ['39'] conf: 0.9739292364990689 support: 0.011864656707614479 lift: 5.505422891702643  
 Rule 72 ] ['37'] ==> ['40'] conf: 0.6938010899182562 support: 0.023105454792935652 lift: 1.2070290653829971  
 Rule 73 ] ['39'] ==> ['40'] conf: 0.6633111054116441 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 74 ] ['40'] ==> ['39'] conf: 0.20414405525407003 support: 0.11734213541134969 lift: 1.1539846149816664  
 Rule 75 ] ['39'] ==> ['42'] conf: 0.24987176199025393 support: 0.044203219110491035 lift: 1.4740009641233038  
 Rule 76 ] ['42'] ==> ['39'] conf: 0.2607561057209769 support: 0.044203219110491035 lift: 1.4740009641233038  
 Rule 77 ] ['42'] ==> ['40'] conf: 0.7637336901973905 support: 0.1294676784519232 lift: 1.3286931595755724  
 Rule 78 ] ['40'] ==> ['42'] conf: 0.22523926985693143 support: 0.1294676784519232 lift: 1.3286931595755727  
 Rule 79 ] ['311'] ==> ['40', '49'] conf: 0.5192752505782575 support: 0.015278864804165107 lift: 1.570922564210753  
 Rule 80 ] ['40', '49'] ==> ['311'] conf: 0.08901242193397844 support: 0.015278864804165107 lift: 3.025221330039119  
 Rule 81 ] ['111'] ==> ['40', '49'] conf: 0.3711524695776664 support: 0.01176257075123921 lift: 1.1228183676630517  
 Rule 82 ] ['40', '49'] ==> ['111'] conf: 0.09587536888339854 support: 0.01176257075123921 lift: 3.025221330039119  
 Rule 83 ] ['39'] ==> ['49', '111'] conf: 0.0872659656322134 support: 0.015437665180748857 lift: 5.574967243551859  
 Rule 84 ] ['49', '111'] ==> ['39'] conf: 11.30144927536232 support: 0.015437665180748857 lift: 63.88478260869566  
 Rule 85 ] ['111'] ==> ['49', '39'] conf: 0.48711524695776665 support: 0.015437665180748857 lift: 5.405912296959173  
 Rule 86 ] ['49', '39'] ==> ['111'] conf: 0.3517119838872105 support: 0.015437665180748857 lift: 11.097809667673717  
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 Rule 93 ] ['66'] ==> ['40', '49'] conf: 0.40183363148479434 support: 0.020383162622928507 lift: 1.2156356730948787  
 Rule 94 ] ['40', '49'] ==> ['66'] conf: 0.153455493789033 support: 0.020383162622928507 lift: 3.025221330039119  
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 Rule 102 ]['40', '39'] ==> ['33'] conf: 1.4661188980183664 support: 0.02087090663672145 lift: 8.52208796520058  
 Rule 103 ]['33'] ==> ['49', '42'] conf: 0.13601898859365727 support: 0.02340036977801976 lift: 1.3297371982041937  
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 Rule 107 ]['33'] ==> ['40', '42'] conf: 0.15553504318586403 support: 0.026757863454361906 lift: 1.2013426443235464  
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For 10% Random Sampled data– With minimum support threshold as 1%

-----FOR 0.01 MIN SUPPORT threshold-----

-----FOR 0.1 SAMPLE DATA-----

Frequent set:

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**No of Candidate sets: 13288**

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 Rule 154 ]['33'] ==> ['40', '39'] conf: 0.1341309823677582 support: 0.024160617059891108 lift: 1.0858574293426595

Rule 155 ]['40', '39'] ==> ['33'] conf: 1.45821854912764 support: 0.024160617059891108 lift: 8.095500459136822  
 Rule 156 ]['39'] ==> ['40', '287'] conf: 0.0555555555555556 support: 0.010208711433756805 lift: 5.382173382173383  
 Rule 157 ]['40', '287'] ==> ['39'] conf: 17.8021978021978 support: 0.010208711433756805 lift: 96.87912087912088  
 Rule 158 ]['287'] ==> ['40', '39'] conf: 0.7086614173228346 support: 0.010208711433756805 lift: 5.736968829309559  
 Rule 159 ]['40', '39'] ==> ['287'] conf: 0.11662075298438936 support: 0.010208711433756805 lift: 8.095500459136822  
 Rule 160 ]['42'] ==> ['40', '49'] conf: 0.4931506849315068 support: 0.08166969147005444 lift: 1.4752685572976465  
 Rule 161 ]['40', '49'] ==> ['42'] conf: 0.49541907024092297 support: 0.08166969147005444 lift: 2.9915167967424496  
 Rule 162 ]['49'] ==> ['40', '42'] conf: 0.16909347111319867 support: 0.08166969147005444 lift: 1.3552073103035995  
 Rule 163 ]['40', '42'] ==> ['49'] conf: 3.870909090909091 support: 0.08166969147005444 lift: 8.014545454545456  
 Rule 164 ]['40'] ==> ['49', '42'] conf: 0.14178810555336746 support: 0.08166969147005444 lift: 1.4044988073690872  
 Rule 165 ]['49', '42'] ==> ['40'] conf: 5.70561797752809 support: 0.08166969147005444 lift: 9.90561797752809  
 Rule 166 ]['311'] ==> ['40', '49'] conf: 0.5103734439834025 support: 0.013951905626134301 lift: 1.5267907302876402  
 Rule 167 ]['40', '49'] ==> ['311'] conf: 0.08177807940278249 support: 0.013951905626134301 lift: 2.99151679674245  
 Rule 168 ]['33'] ==> ['40', '49'] conf: 0.35012594458438284 support: 0.06306715063520871 lift: 1.0474076441994975  
 Rule 169 ]['40', '49'] ==> ['33'] conf: 0.5388530709195792 support: 0.06306715063520871 lift: 2.99151679674245  
 Rule 170 ]['49'] ==> ['40', '33'] conf: 0.13057773602630343 support: 0.06306715063520871 lift: 1.3292994466603822  
 Rule 171 ]['40', '33'] ==> ['49'] conf: 4.916859122401847 support: 0.06306715063520871 lift: 10.18013856812933  
 Rule 172 ]['40'] ==> ['49', '33'] conf: 0.10949192595510043 support: 0.06306715063520871 lift: 1.1423441647575923  
 Rule 173 ]['49', '33'] ==> ['40'] conf: 6.0094674556213015 support: 0.06306715063520871 lift: 10.433136094674555  
 Rule 174 ]['33'] ==> ['40', '42'] conf: 0.14924433249370278 support: 0.026882940108892923 lift: 1.196125486604076  
 Rule 175 ]['40', '42'] ==> ['33'] conf: 1.4436363636363636 support: 0.026882940108892923 lift: 8.014545454545454  
 Rule 176 ]['42'] ==> ['40', '33'] conf: 0.16232876712328767 support: 0.026882940108892923 lift: 1.6525293429086652  
 Rule 177 ]['40', '33'] ==> ['42'] conf: 1.6859122401847575 support: 0.026882940108892923 lift: 10.18013856812933  
 Rule 178 ]['33'] ==> ['49', '42'] conf: 0.13098236775818642 support: 0.023593466424682397 lift: 1.297461296804687  
 Rule 179 ]['49', '42'] ==> ['33'] conf: 1.7842696629213484 support: 0.023593466424682397 lift: 9.90561797752809  
 Rule 180 ]['42'] ==> ['49', '33'] conf: 0.14246575342465753 support: 0.023593466424682397 lift: 1.4863645943097998  
 Rule 181 ]['49', '33'] ==> ['42'] conf: 1.7278106508875741 support: 0.023593466424682397 lift: 10.433136094674557  
 Rule 182 ]['226'] ==> ['40', '49'] conf: 0.4123076923076923 support: 0.015199637023593466 lift: 1.2334253869645795  
 Rule 183 ]['40', '49'] ==> ['226'] conf: 0.11028164234815066 support: 0.015199637023593466 lift: 2.99151679674245  
 Rule 184 ]['37', '39'] ==> ['40', '49'] conf: 0.38028169014084506 support: 0.012250453720508167 lift: 1.1376190635499457  
 Rule 185 ]['40', '37'] ==> ['49', '39'] conf: 0.5118483412322274 support: 0.012250453720508167 lift: 5.290099620519715  
 Rule 186 ]['40', '39'] ==> ['49', '37'] conf: 0.09917355371900827 support: 0.012250453720508167 lift: 6.381854376545816  
 Rule 187 ]['49', '37'] ==> ['40', '39'] conf: 0.7883211678832117 support: 0.012250453720508167 lift: 6.381854376545816  
 Rule 188 ]['49', '39'] ==> ['40', '37'] conf: 0.12661195779601406 support: 0.012250453720508167 lift: 5.290099620519715  
 Rule 189 ]['37'] ==> ['40', '49', '39'] conf: 0.36120401337792646 support: 0.012250453720508167 lift: 4.802978253302865  
 Rule 190 ]['40', '49', '39'] ==> ['37'] conf: 0.4509803921568627 support: 0.012250453720508167 lift: 13.29713423831071  
 Rule 191 ]['39'] ==> ['40', '49', '37'] conf: 0.06666666666666667 support: 0.012250453720508167 lift: 5.20117994100295  
 Rule 192 ]['40', '49', '37'] ==> ['39'] conf: 14.336283185840708 support: 0.012250453720508167 lift: 78.01769911504425  
 Rule 193 ]['171', '39'] ==> ['40', '49'] conf: 0.382089552238806 support: 0.014519056261343012 lift: 1.1430273133821898  
 Rule 194 ]['40', '39'] ==> ['171', '49'] conf: 0.11753902662993572 support: 0.014519056261343012 lift: 6.0245584812181  
 Rule 195 ]['40', '171'] ==> ['49', '39'] conf: 0.5898617511520737 support: 0.014519056261343012 lift: 6.0963906191754775  
 Rule 196 ]['49', '39'] ==> ['40', '171'] conf: 0.15005861664712777 support: 0.014519056261343012 lift: 6.096390619175477  
 Rule 197 ]['171', '49'] ==> ['40', '39'] conf: 0.7441860465116278 support: 0.014519056261343012 lift: 6.0245584812181  
 Rule 198 ]['39'] ==> ['40', '49', '171'] conf: 0.07901234567901234 support: 0.014519056261343012 lift: 5.399789453536224

Rule 199 ] ['40', '49', '171'] ==> ['39'] conf: 12.55813953488372 support: 0.014519056261343012 lift: 68.34108527131782  
 Rule 200 ] ['171'] ==> ['40', '49', '39'] conf: 0.37317784256559766 support: 0.014519056261343012 lift: 4.9621958673579325  
 Rule 201 ] ['40', '49', '39'] ==> ['171'] conf: 0.5173453996983409 support: 0.014519056261343012 lift: 13.29713423831071  
 Rule 202 ] ['40', '39'] ==> ['49', '42'] conf: 0.19191919191919 support: 0.023706896551724137 lift: 1.9010781977074112  
 Rule 203 ] ['42', '39'] ==> ['40', '49'] conf: 0.529113924050633 support: 0.023706896551724137 lift: 1.5828531911877775  
 Rule 204 ] ['40', '42'] ==> ['49', '39'] conf: 0.19 support: 0.023706896551724137 lift: 1.963704572098476  
 Rule 205 ] ['49', '39'] ==> ['40', '42'] conf: 0.24501758499413834 support: 0.023706896551724137 lift: 1.963704572098476  
 Rule 206 ] ['40', '49'] ==> ['42', '39'] conf: 0.07091957923311842 support: 0.023706896551724137 lift: 1.5828531911877775  
 Rule 207 ] ['49', '42'] ==> ['40', '39'] conf: 0.2348314606741573 support: 0.023706896551724137 lift: 1.9010781977074112  
 Rule 208 ] ['39'] ==> ['40', '49', '42'] conf: 0.12901234567901235 support: 0.023706896551724137 lift: 1.579684499314129  
 Rule 209 ] ['40', '49', '42'] ==> ['39'] conf: 2.25 support: 0.023706896551724137 lift: 12.244444444444445  
 Rule 210 ] ['42'] ==> ['40', '49', '39'] conf: 0.14315068493150684 support: 0.023706896551724137 lift: 1.9034938738403686  
 Rule 211 ] ['40', '49', '39'] ==> ['42'] conf: 2.20211161387632 support: 0.023706896551724137 lift: 13.29713423831071  
 Rule 212 ] ['111', '39'] ==> ['40', '49'] conf: 0.3947368421052631 support: 0.01191016333938294 lift: 1.180861893450967  
 Rule 213 ] ['40', '39'] ==> ['49', '111'] conf: 0.09641873278236915 support: 0.01191016333938294 lift: 5.822106494584702  
 Rule 214 ] ['40', '111'] ==> ['49', '39'] conf: 0.6140350877192982 support: 0.01191016333938294 lift: 6.346228995701445  
 Rule 215 ] ['49', '39'] ==> ['40', '111'] conf: 0.123094958968347 support: 0.01191016333938294 lift: 6.346228995701446  
 Rule 216 ] ['49', '111'] ==> ['40', '39'] conf: 0.7191780821917808 support: 0.01191016333938294 lift: 5.822106494584701  
 Rule 217 ] ['39'] ==> ['40', '49', '111'] conf: 0.06481481481481481 support: 0.01191016333938294 lift: 5.441975308641975  
 Rule 218 ] ['40', '49', '111'] ==> ['39'] conf: 15.428571428571427 support: 0.01191016333938294 lift: 83.96190476190476  
 Rule 219 ] ['111'] ==> ['40', '49', '39'] conf: 0.3804347826086957 support: 0.01191016333938294 lift: 5.058692373270379  
 Rule 220 ] ['40', '49', '39'] ==> ['111'] conf: 0.41628959276018096 support: 0.01191016333938294 lift: 13.29713423831071  
 Rule 221 ] ['40', '39'] ==> ['49', '33'] conf: 0.13957759412304865 support: 0.017241379310344827 lift: 1.4562320352530143  
 Rule 222 ] ['33', '39'] ==> ['40', '49'] conf: 0.48874598070739556 support: 0.017241379310344827 lift: 1.4620918106265353  
 Rule 223 ] ['40', '33'] ==> ['49', '39'] conf: 0.17551963048498845 support: 0.017241379310344827 lift: 1.814045794086352  
 Rule 224 ] ['49', '39'] ==> ['40', '33'] conf: 0.17819460726846426 support: 0.017241379310344827 lift: 1.8140457940863521  
 Rule 225 ] ['40', '49'] ==> ['33', '39'] conf: 0.05157787580590431 support: 0.017241379310344827 lift: 1.4620918106265353  
 Rule 226 ] ['49', '33'] ==> ['40', '39'] conf: 0.17988165680473372 support: 0.017241379310344827 lift: 1.4562320352530143  
 Rule 227 ] ['39'] ==> ['40', '49', '33'] conf: 0.09382716049382717 support: 0.017241379310344827 lift: 1.4877342570388137  
 Rule 228 ] ['40', '49', '33'] ==> ['39'] conf: 2.9136690647482015 support: 0.017241379310344827 lift: 15.85611510791367  
 Rule 229 ] ['33'] ==> ['40', '49', '39'] conf: 0.09571788413098237 support: 0.017241379310344827 lift: 1.2727735542967429  
 Rule 230 ] ['40', '49', '39'] ==> ['33'] conf: 2.3951734539969833 support: 0.017241379310344827 lift: 13.29713423831071  
 Rule 231 ] ['40', '33'] ==> ['49', '42'] conf: 0.19168591224018477 support: 0.01882940108892922 lift: 1.898767418325246  
 Rule 232 ] ['40', '42'] ==> ['49', '33'] conf: 0.1509090909090909 support: 0.01882940108892922 lift: 1.5744550833781603  
 Rule 233 ] ['42', '33'] ==> ['40', '49'] conf: 0.5076452599388379 support: 0.01882940108892922 lift: 1.5186293218937208  
 Rule 234 ] ['40', '49'] ==> ['42', '33'] conf: 0.05632846963013234 support: 0.01882940108892922 lift: 1.5186293218937208  
 Rule 235 ] ['49', '33'] ==> ['40', '42'] conf: 0.19644970414201185 support: 0.01882940108892922 lift: 1.5744550833781605  
 Rule 236 ] ['49', '42'] ==> ['40', '33'] conf: 0.18651685393258427 support: 0.01882940108892922 lift: 1.8987674183252459  
 Rule 237 ] ['33'] ==> ['40', '49', '42'] conf: 0.10453400503778339 support: 0.01882940108892922 lift: 1.2799608172404144  
 Rule 238 ] ['40', '49', '42'] ==> ['33'] conf: 2.2055555555555557 support: 0.01882940108892922 lift: 12.244444444444445  
 Rule 239 ] ['42'] ==> ['40', '49', '33'] conf: 0.1136986301369863 support: 0.01882940108892922 lift: 1.802818567064157  
 Rule 240 ] ['40', '49', '33'] ==> ['42'] conf: 2.6258992805755397 support: 0.01882940108892922 lift: 15.85611510791367

For 20% Random Sampled data– With minimum support threshold as 1%

-----FOR 0.01 MIN SUPPORT threshold-----

-----FOR 0.2 SAMPLE DATA-----

Frequent set:

[[['13042'], ['605'], ['287'], ['16011'], ['593'], ['202'], ['50'], ['118'], ['77'], ['38'], ['1005'], ['534'], ['250'], ['590'], ['124'], ['439'], ['549'], ['15833'], ['773'], ['20'], ['66'], ['61'], ['523'], ['406'], ['226'], ['265'], ['259'], ['111'], ['1328'], ['180'], ['476'], ['271'], ['825'], ['3271'], ['186'], ['32'], ['414'], ['90'], ['480'], ['339'], ['14099'], ['741'], ['102'], ['46'], ['272'], ['16218'], ['79'], ['162'], ['1147'], ['37'], ['311'], ['176'], ['148'], ['238'], ['650'], ['1394'], ['12926'], ['10516'], ['2239'], ['302'], ['2959'], ['678'], ['256'], ['33'], ['80'], ['49'], ['39'], ['171'], ['10'], ['42'], ['40']] -----Length: 71

[[['49', '1328'], ['49', '311'], ['271', '49'], ['124', '49'], ['49', '439'], ['49', '102'], ['40', '534'], ['476', '40'], ['476', '49'], ['287', '39'], ['42', '66'], ['40', '66'], ['49', '66'], ['38', '39'], ['238', '49'], ['40', '439'], ['271', '40'], ['49', '148'], ['40', '226'], ['49', '226'], ['61', '40'], ['61', '49'], ['40', '414'], ['40', '111'], ['111', '39'], ['49', '111'], ['40', '1328'], ['33', '39'], ['49', '37'], ['40', '90'], ['49', '414'], ['42', '33'], ['2239', '49'], ['49', '90'], ['40', '102'], ['49', '12926'], ['40', '272'], ['49', '272'], ['40', '1147'], ['40', '148'], ['40', '311'], ['40', '37'], ['39', '37'], ['238', '40'], ['40', '2239'], ['40', '12926'], ['40', '256'], ['49', '256'], ['40', '33'], ['49', '33'], ['171', '40'], ['40', '39'], ['42', '39'], ['171', '39'], ['40', '49'], ['49', '42'], ['171', '49'], ['49', '39'], ['80', '40'], ['80', '49'], ['40', '42']] -----Length: 61

[[['40', '49', '311'], ['476', '49', '40'], ['40', '49', '66'], ['238', '49', '40'], ['49', '33', '39'], ['40', '42', '33'], ['40', '33', '39'], ['40', '49', '226'], ['40', '49', '414'], ['49', '111', '39'], ['40', '49', '111'], ['40', '111', '39'], ['40', '49', '37'], ['49', '39', '37'], ['40', '49', '90'], ['40', '49', '33'], ['49', '42', '33'], ['40', '39', '37'], ['49', '42', '39'], ['40', '49', '42'], ['171', '49', '39'], ['40', '42', '39'], ['40', '49', '39'], ['171', '49', '40'], ['171', '39', '40']] -----Length: 25

[[['49', '33', '40', '39'], ['49', '33', '42', '40'], ['49', '40', '111', '39'], ['49', '40', '39', '37'], ['49', '40', '171', '39'], ['49', '42', '40', '39']] -----Length: 6

[] -----Length: 0

**Execution Time: 0:00:50.454045**

**No of Candidate sets: 15130**

**No of frequent sets: 163**

Rule 1 ] ['1328'] ==> ['49'] conf: 0.5640243902439024 support: 0.01049228675136116 lift: 1.1815228761768428  
Rule 2 ] ['311'] ==> ['49'] conf: 0.6372360844529751 support: 0.01882940108892922 lift: 1.3348873281543134  
Rule 3 ] ['271'] ==> ['49'] conf: 0.5229885057471265 support: 0.010322141560798548 lift: 1.0955605718585404  
Rule 4 ] ['124'] ==> ['49'] conf: 0.6133333333333334 support: 0.010435571687840291 lift: 1.2848156508653124  
Rule 5 ] ['439'] ==> ['49'] conf: 0.5488126649076517 support: 0.011796733212341199 lift: 1.1496572303257353  
Rule 6 ] ['102'] ==> ['49'] conf: 0.5700712589073634 support: 0.013611615245009074 lift: 1.1941899057924001  
Rule 7 ] ['534'] ==> ['40'] conf: 0.6578947368421053 support: 0.011343012704174229 lift: 1.1450004935346956  
Rule 8 ] ['476'] ==> ['40'] conf: 0.7115384615384616 support: 0.01678765880217786 lift: 1.2383620722382938  
Rule 9 ] ['476'] ==> ['49'] conf: 0.6802884615384616 support: 0.016050362976406534 lift: 1.4250737975342942  
Rule 10 ] ['39'] ==> ['287'] conf: 0.07702060221870048 support: 0.013781760435571689 lift: 5.3255970914514785  
Rule 11 ] ['287'] ==> ['39'] conf: 0.9529411764705883 support: 0.013781760435571689 lift: 5.325597091451478  
Rule 12 ] ['66'] ==> ['42'] conf: 0.21349557522123894 support: 0.01094600725952813 lift: 1.2760521973901306  
Rule 13 ] ['42'] ==> ['66'] conf: 0.06542372881355932 support: 0.01094600725952813 lift: 1.2760521973901304  
Rule 14 ] ['66'] ==> ['40'] conf: 0.629424778761062 support: 0.03227087114337568 lift: 1.0954513571330613  
Rule 15 ] ['40'] ==> ['66'] conf: 0.056164248346658764 support: 0.03227087114337568 lift: 1.0954513571330613  
Rule 16 ] ['66'] ==> ['49'] conf: 0.5619469026548674 support: 0.028811252268602542 lift: 1.1771709382928146  
Rule 17 ] ['49'] ==> ['66'] conf: 0.060354045384341214 support: 0.028811252268602542 lift: 1.1771709382928146  
Rule 18 ] ['39'] ==> ['38'] conf: 0.0716323296354992 support: 0.012817604355716878 lift: 5.420692000571339  
Rule 19 ] ['38'] ==> ['39'] conf: 0.9699570815450643 support: 0.012817604355716878 lift: 5.420692000571338  
Rule 20 ] ['238'] ==> ['49'] conf: 0.5646481178396073 support: 0.019566696914700546 lift: 1.1828294658129923



Rule 21 ] ['439'] ==> ['40'] conf: 0.6754617414248021 support: 0.014519056261343012 lift: 1.175574121488709  
 Rule 22 ] ['271'] ==> ['40'] conf: 0.6695402298850575 support: 0.013214609800362976 lift: 1.1652683183627808  
 Rule 23 ] ['148'] ==> ['49'] conf: 0.5738161559888579 support: 0.011683303085299456 lift: 1.202034746631287  
 Rule 24 ] ['226'] ==> ['40'] conf: 0.7069243156199678 support: 0.024897912885662433 lift: 1.2303316092203407  
 Rule 25 ] ['226'] ==> ['49'] conf: 0.5249597423510467 support: 0.018489110707803992 lift: 1.0996899343155109  
 Rule 26 ] ['61'] ==> ['40'] conf: 0.6818181818181818 support: 0.01191016333938294 lift: 1.1866368751177752  
 Rule 27 ] ['61'] ==> ['49'] conf: 0.577922077922078 support: 0.010095281306715064 lift: 1.2106358652634048  
 Rule 28 ] ['414'] ==> ['40'] conf: 0.6325 support: 0.0143489110707804 lift: 1.100803474484256  
 Rule 29 ] ['111'] ==> ['40'] conf: 0.6424682395644283 support: 0.020077132486388385 lift: 1.1181522061000888  
 Rule 30 ] ['39'] ==> ['111'] conf: 0.17020602218700476 support: 0.030455989110707803 lift: 5.446592709984152  
 Rule 31 ] ['111'] ==> ['39'] conf: 0.9745916515426497 support: 0.030455989110707803 lift: 5.446592709984152  
 Rule 32 ] ['111'] ==> ['49'] conf: 0.5372050816696915 support: 0.01678765880217786 lift: 1.125341570630866  
 Rule 33 ] ['1328'] ==> ['40'] conf: 0.6280487804878049 support: 0.011683303085299456 lift: 1.0930565687060483  
 Rule 34 ] ['39'] ==> ['33'] conf: 0.1768621236133122 support: 0.0316470054446461 lift: 1.0560219991703084  
 Rule 35 ] ['33'] ==> ['39'] conf: 0.18896037927531323 support: 0.0316470054446461 lift: 1.0560219991703084  
 Rule 36 ] ['37'] ==> ['49'] conf: 0.48722316865417387 support: 0.01622050816696915 lift: 1.0206390530724003  
 Rule 37 ] ['90'] ==> ['40'] conf: 0.7128834355828221 support: 0.032951451905626136 lift: 1.2407028660740615  
 Rule 38 ] ['40'] ==> ['90'] conf: 0.05734873161583259 support: 0.032951451905626136 lift: 1.2407028660740615  
 Rule 39 ] ['414'] ==> ['49'] conf: 0.6025 support: 0.013668330308529946 lift: 1.2621218961625282  
 Rule 40 ] ['33'] ==> ['42'] conf: 0.21063325431764304 support: 0.03527676950998185 lift: 1.2589442508910786  
 Rule 41 ] ['42'] ==> ['33'] conf: 0.21084745762711862 support: 0.03527676950998185 lift: 1.2589442508910786  
 Rule 42 ] ['2239'] ==> ['49'] conf: 0.5632183908045978 support: 0.011116152450090745 lift: 1.179834462001505  
 Rule 43 ] ['90'] ==> ['49'] conf: 0.70920245398773 support: 0.03278130671506352 lift: 1.485643063884003  
 Rule 44 ] ['49'] ==> ['90'] conf: 0.06867054770108114 support: 0.03278130671506352 lift: 1.485643063884003  
 Rule 45 ] ['102'] ==> ['40'] conf: 0.6104513064133017 support: 0.014575771324863884 lift: 1.0624299116256377  
 Rule 46 ] ['12926'] ==> ['49'] conf: 0.5894039735099338 support: 0.010095281306715064 lift: 1.2346882334474458  
 Rule 47 ] ['272'] ==> ['40'] conf: 0.6914153132250581 support: 0.016901088929219602 lift: 1.2033397298178092  
 Rule 48 ] ['272'] ==> ['49'] conf: 0.4988399071925754 support: 0.012193738656987295 lift: 1.0449738913650337  
 Rule 49 ] ['1147'] ==> ['40'] conf: 0.7153846153846153 support: 0.010549001814882032 lift: 1.2450559212774195  
 Rule 50 ] ['148'] ==> ['40'] conf: 0.6350974930362118 support: 0.01293103448275862 lift: 1.1053241533130476  
 Rule 51 ] ['311'] ==> ['40'] conf: 0.7024952015355086 support: 0.02075771324863884 lift: 1.2226231757451473  
 Rule 52 ] ['37'] ==> ['40'] conf: 0.68824531516184 support: 0.022912885662431944 lift: 1.1978226628105382  
 Rule 53 ] ['37'] ==> ['39'] conf: 0.959114139693356 support: 0.03193058076225045 lift: 5.360095249151586  
 Rule 54 ] ['39'] ==> ['37'] conf: 0.1784469096671949 support: 0.03193058076225045 lift: 5.360095249151586  
 Rule 55 ] ['238'] ==> ['40'] conf: 0.6546644844517185 support: 0.022686025408348458 lift: 1.1393785598512192  
 Rule 56 ] ['2239'] ==> ['40'] conf: 0.7557471264367817 support: 0.01491606170598911 lift: 1.3153028657914652  
 Rule 57 ] ['12926'] ==> ['40'] conf: 0.6721854304635762 support: 0.011513157894736841 lift: 1.1698720274339922  
 Rule 58 ] ['256'] ==> ['40'] conf: 0.7482993197278911 support: 0.01247731397459165 lift: 1.3023406974081706  
 Rule 59 ] ['256'] ==> ['49'] conf: 0.7142857142857143 support: 0.01191016333938294 lift: 1.4962915188648822  
 Rule 60 ] ['33'] ==> ['40'] conf: 0.5509651202167287 support: 0.09227540834845735 lift: 0.9589001085442069  
 Rule 61 ] ['40'] ==> ['33'] conf: 0.16059618991215083 support: 0.09227540834845735 lift: 0.9589001085442069  
 Rule 62 ] ['33'] ==> ['49'] conf: 0.5174398916356248 support: 0.0866606170598911 lift: 1.0839372899274486  
 Rule 63 ] ['49'] ==> ['33'] conf: 0.18153736485683733 support: 0.0866606170598911 lift: 1.0839372899274486  
 Rule 64 ] ['171'] ==> ['40'] conf: 0.6286594761171032 support: 0.023139745916515426 lift: 1.0941194238374061

Rule 65 ] ['39'] ==> ['40'] conf: 0.6545166402535657 support: 0.11711660617059891 lift: 1.1391212516978453  
 Rule 66 ] ['40'] ==> ['39'] conf: 0.20382982923699536 support: 0.11711660617059891 lift: 1.1391212516978453  
 Rule 67 ] ['39'] ==> ['42'] conf: 0.24152139461172742 support: 0.043216878402903815 lift: 1.4435610948454163  
 Rule 68 ] ['42'] ==> ['39'] conf: 0.25830508474576275 support: 0.043216878402903815 lift: 1.4435610948454163  
 Rule 69 ] ['39'] ==> ['171'] conf: 0.20158478605388272 support: 0.03607078039927405 lift: 5.476645528046317  
 Rule 70 ] ['171'] ==> ['39'] conf: 0.9799691833590138 support: 0.03607078039927405 lift: 5.476645528046317  
 Rule 71 ] ['49'] ==> ['40'] conf: 0.688844006177973 support: 0.32883393829401086 lift: 1.1988646251041377  
 Rule 72 ] ['40'] ==> ['49'] conf: 0.5723028328891521 support: 0.32883393829401086 lift: 1.198864625104138  
 Rule 73 ] ['42'] ==> ['49'] conf: 0.6159322033898306 support: 0.10305127041742287 lift: 1.2902597849791484  
 Rule 74 ] ['49'] ==> ['42'] conf: 0.21587263870737794 support: 0.10305127041742287 lift: 1.2902597849791484  
 Rule 75 ] ['171'] ==> ['49'] conf: 0.49768875192604 support: 0.018318965517241378 lift: 1.0425624419579347  
 Rule 76 ] ['39'] ==> ['49'] conf: 0.5185419968304279 support: 0.09278584392014519 lift: 1.086245988845682  
 Rule 77 ] ['49'] ==> ['39'] conf: 0.1943685398598075 support: 0.09278584392014519 lift: 1.0862459888456817  
 Rule 78 ] ['80'] ==> ['40'] conf: 0.7080745341614906 support: 0.01293103448275862 lift: 1.2323334504328696  
 Rule 79 ] ['80'] ==> ['49'] conf: 0.6055900621118012 support: 0.011059437386569873 lift: 1.2685949833854435  
 Rule 80 ] ['42'] ==> ['40'] conf: 0.7783050847457629 support: 0.13021778584392016 lift: 1.3545627533547815  
 Rule 81 ] ['40'] ==> ['42'] conf: 0.22663113216859146 support: 0.13021778584392016 lift: 1.3545627533547813  
 Rule 82 ] ['311'] ==> ['40', '49'] conf: 0.510556621880998 support: 0.015086206896551725 lift: 1.552627519317999  
 Rule 83 ] ['40', '49'] ==> ['311'] conf: 0.0898585719213522 support: 0.015086206896551725 lift: 3.0410486374611936  
 Rule 84 ] ['476'] ==> ['40', '49'] conf: 0.5288461538461537 support: 0.01247731397459165 lift: 1.6082468755804387  
 Rule 85 ] ['40', '49'] ==> ['476'] conf: 0.07174887892376683 support: 0.01247731397459165 lift: 3.041048637461194  
 Rule 86 ] ['66'] ==> ['40', '49'] conf: 0.3949115044247788 support: 0.020247277676951 lift: 1.2009450924487237  
 Rule 87 ] ['40', '49'] ==> ['66'] conf: 0.1559158330458779 support: 0.020247277676951 lift: 3.0410486374611936  
 Rule 88 ] ['238'] ==> ['40', '49'] conf: 0.4206219312602292 support: 0.014575771324863884 lift: 1.2791317509452158  
 Rule 89 ] ['40', '49'] ==> ['238'] conf: 0.10538116591928251 support: 0.014575771324863884 lift: 3.0410486374611936  
 Rule 90 ] ['39'] ==> ['49', '33'] conf: 0.101743264659271 support: 0.01820553539019964 lift: 1.1740426979530538  
 Rule 91 ] ['49', '33'] ==> ['39'] conf: 2.0647905759162306 support: 0.01820553539019964 lift: 11.539267015706807  
 Rule 92 ] ['33'] ==> ['49', '39'] conf: 0.10870301388418557 support: 0.01820553539019964 lift: 1.1715473965806602  
 Rule 93 ] ['49', '39'] ==> ['33'] conf: 1.8050122249388754 support: 0.01820553539019964 lift: 10.777506112469437  
 Rule 94 ] ['33'] ==> ['40', '42'] conf: 0.15204876396884523 support: 0.025465063520871144 lift: 1.1676497414192852  
 Rule 95 ] ['40', '42'] ==> ['33'] conf: 1.286149825783972 support: 0.025465063520871144 lift: 7.6794425087108005  
 Rule 96 ] ['42'] ==> ['40', '33'] conf: 0.1522033898305085 support: 0.025465063520871144 lift: 1.6494469388392905  
 Rule 97 ] ['40', '33'] ==> ['42'] conf: 1.8131530424093423 support: 0.025465063520871144 lift: 10.837123540258144  
 Rule 98 ] ['39'] ==> ['40', '33'] conf: 0.11188589540412044 support: 0.020020417422867514 lift: 1.2125212709068542  
 Rule 99 ] ['40', '33'] ==> ['39'] conf: 1.9391518131530425 support: 0.020020417422867514 lift: 10.837123540258144  
 Rule 100 ] ['33'] ==> ['40', '39'] conf: 0.11953945140535048 support: 0.020020417422867514 lift: 1.0206874611036996  
 Rule 101 ] ['40', '39'] ==> ['33'] conf: 1.4300242130750607 support: 0.020020417422867514 lift: 8.538498789346248  
 Rule 102 ] ['226'] ==> ['40', '49'] conf: 0.4219001610305958 support: 0.014859346642468239 lift: 1.2830189098467515  
 Rule 103 ] ['40', '49'] ==> ['226'] conf: 0.10710589858571923 support: 0.014859346642468239 lift: 3.041048637461194  
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 Rule 105 ] ['40', '49'] ==> ['414'] conf: 0.0689893066574681 support: 0.010151996370235934 lift: 3.0410486374611936  
 Rule 106 ] ['39'] ==> ['49', '111'] conf: 0.09381933438985737 support: 0.01678765880217786 lift: 5.588589540412045  
 Rule 107 ] ['49', '111'] ==> ['39'] conf: 10.658783783783784 support: 0.01678765880217786 lift: 59.567567567567565  
 Rule 108 ] ['111'] ==> ['49', '39'] conf: 0.5372050816696915 support: 0.01678765880217786 lift: 5.789731051344743

Rule 109 ]['49', '39'] ==> ['111'] conf: 0.3367970660146699 support: 0.01678765880217786 lift: 10.777506112469437  
 Rule 110 ]['111'] ==> ['40', '49'] conf: 0.3938294010889292 support: 0.012307168784029038 lift: 1.197654363573646  
 Rule 111 ]['40', '49'] ==> ['111'] conf: 0.0950327699206623 support: 0.012307168784029038 lift: 3.0410486374611936  
 Rule 112 ]['39'] ==> ['40', '111'] conf: 0.11125198098256735 support: 0.01990698729582577 lift: 5.541228612103467  
 Rule 113 ]['40', '111'] ==> ['39'] conf: 8.912429378531073 support: 0.01990698729582577 lift: 49.807909604519764  
 Rule 114 ]['111'] ==> ['40', '39'] conf: 0.6370235934664247 support: 0.01990698729582577 lift: 5.439225181598063  
 Rule 115 ]['40', '39'] ==> ['111'] conf: 0.26682808716707024 support: 0.01990698729582577 lift: 8.538498789346248  
 Rule 116 ]['37'] ==> ['40', '49'] conf: 0.38671209540034074 support: 0.012874319419237749 lift: 1.1760102908069694  
 Rule 117 ]['40', '49'] ==> ['37'] conf: 0.10124180751983443 support: 0.012874319419237749 lift: 3.041048637461194  
 Rule 118 ]['37'] ==> ['49', '39'] conf: 0.4718909710391823 support: 0.015710072595281305 lift: 5.085807824793926  
 Rule 119 ]['49', '39'] ==> ['37'] conf: 0.35880195599022 support: 0.015710072595281305 lift: 10.777506112469437  
 Rule 120 ]['39'] ==> ['49', '37'] conf: 0.087797147385103 support: 0.015710072595281305 lift: 5.412724834594881  
 Rule 121 ]['49', '37'] ==> ['39'] conf: 11.031468531468532 support: 0.015710072595281305 lift: 61.650349650349646  
 Rule 122 ]['90'] ==> ['40', '49'] conf: 0.5423312883435583 support: 0.025068058076225044 lift: 1.6492558254697516  
 Rule 123 ]['40', '49'] ==> ['90'] conf: 0.14056571231459125 support: 0.025068058076225044 lift: 3.0410486374611936  
 Rule 124 ]['49'] ==> ['40', '90'] conf: 0.05251277177141499 support: 0.025068058076225044 lift: 1.5936406056344046  
 Rule 125 ]['40', '90'] ==> ['49'] conf: 14.487091222030982 support: 0.025068058076225044 lift: 30.347676419965577  
 Rule 126 ]['33'] ==> ['40', '49'] conf: 0.3443955299695225 support: 0.05767921960072595 lift: 1.047323557161542  
 Rule 127 ]['40', '49'] ==> ['33'] conf: 0.5093135563987583 support: 0.05767921960072595 lift: 3.041048637461194  
 Rule 128 ]['49'] ==> ['40', '33'] conf: 0.12082689794463584 support: 0.05767921960072595 lift: 1.3094160200121814  
 Rule 129 ]['40', '33'] ==> ['49'] conf: 5.173325138291334 support: 0.05767921960072595 lift: 10.837123540258144  
 Rule 130 ]['40'] ==> ['49', '33'] conf: 0.10038495706248149 support: 0.05767921960072595 lift: 1.1583688239042367  
 Rule 131 ]['49', '33'] ==> ['40'] conf: 6.630235602094242 support: 0.05767921960072595 lift: 11.539267015706807  
 Rule 132 ]['33'] ==> ['49', '42'] conf: 0.13274635963427023 support: 0.02223230490018149 lift: 1.288158400149396  
 Rule 133 ]['49', '42'] ==> ['33'] conf: 1.6252063841496973 support: 0.02223230490018149 lift: 9.703907539900936  
 Rule 134 ]['42'] ==> ['49', '33'] conf: 0.1328813559322034 support: 0.02223230490018149 lift: 1.5333534475108708  
 Rule 135 ]['49', '33'] ==> ['42'] conf: 1.9306282722513088 support: 0.02223230490018149 lift: 11.539267015706807  
 Rule 136 ]['37'] ==> ['40', '39'] conf: 0.6643952299829643 support: 0.022118874773139747 lift: 5.672937866856962  
 Rule 137 ]['40', '39'] ==> ['37'] conf: 0.28426150121065374 support: 0.022118874773139747 lift: 8.538498789346248  
 Rule 138 ]['39'] ==> ['40', '37'] conf: 0.12361331220285261 support: 0.022118874773139747 lift: 5.394925546437369  
 Rule 139 ]['40', '37'] ==> ['39'] conf: 7.8094059405940595 support: 0.022118874773139747 lift: 43.64356435643564  
 Rule 140 ]['39'] ==> ['49', '42'] conf: 0.15404120443740096 support: 0.027563520871143377 lift: 1.4948016051955166  
 Rule 141 ]['49', '42'] ==> ['39'] conf: 1.736378646119978 support: 0.027563520871143377 lift: 9.703907539900936  
 Rule 142 ]['42'] ==> ['49', '39'] conf: 0.16474576271186442 support: 0.027563520871143377 lift: 1.7755484646305584  
 Rule 143 ]['49', '39'] ==> ['42'] conf: 1.8031784841075793 support: 0.027563520871143377 lift: 10.777506112469437  
 Rule 144 ]['49'] ==> ['42', '39'] conf: 0.05774028751336581 support: 0.027563520871143377 lift: 1.336058762935248  
 Rule 145 ]['42', '39'] ==> ['49'] conf: 11.045931758530184 support: 0.027563520871143377 lift: 23.139107611548557  
 Rule 146 ]['42'] ==> ['40', '49'] conf: 0.5101694915254238 support: 0.08535617059891107 lift: 1.55145023707766  
 Rule 147 ]['40', '49'] ==> ['42'] conf: 0.5087961365988272 support: 0.08535617059891107 lift: 3.0410486374611936  
 Rule 148 ]['49'] ==> ['40', '42'] conf: 0.17880479980990852 support: 0.08535617059891107 lift: 1.3731211804217363  
 Rule 149 ]['40', '42'] ==> ['49'] conf: 3.6659407665505226 support: 0.08535617059891107 lift: 7.679442508710801  
 Rule 150 ]['40'] ==> ['49', '42'] conf: 0.14855394334221694 support: 0.08535617059891107 lift: 1.4415537308805553  
 Rule 151 ]['49', '42'] ==> ['40'] conf: 5.575674188222345 support: 0.08535617059891107 lift: 9.703907539900936  
 Rule 152 ]['39'] ==> ['171', '49'] conf: 0.10047543581616482 support: 0.017978675136116153 lift: 5.484776731611821

Rule 153 ]['171', '49'] ==> ['39'] conf: 9.767801857585141 support: 0.017978675136116153 lift: 54.58823529411765  
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 Rule 155 ]['49', '39'] ==> ['171'] conf: 0.3966992665036675 support: 0.017978675136116153 lift: 10.777506112469437  
 Rule 156 ]['39'] ==> ['40', '42'] conf: 0.19049128367670365 support: 0.03408575317604356 lift: 1.4628668614057658  
 Rule 157 ]['40', '42'] ==> ['39'] conf: 1.374128919860627 support: 0.03408575317604356 lift: 7.6794425087108005  
 Rule 158 ]['42'] ==> ['40', '39'] conf: 0.20372881355932204 support: 0.03408575317604356 lift: 1.7395382279312186  
 Rule 159 ]['40', '39'] ==> ['42'] conf: 1.4285714285714286 support: 0.03408575317604356 lift: 8.538498789346248  
 Rule 160 ]['40'] ==> ['42', '39'] conf: 0.05932287039778896 support: 0.03408575317604356 lift: 1.3726782819603869  
 Rule 161 ]['42', '39'] ==> ['40'] conf: 13.29527559055118 support: 0.03408575317604356 lift: 23.139107611548553  
 Rule 162 ]['39'] ==> ['40', '49'] conf: 0.3889064976228209 support: 0.0695893829401089 lift: 1.1826835746956845  
 Rule 163 ]['40', '49'] ==> ['39'] conf: 0.5441531562607796 support: 0.0695893829401089 lift: 3.0410486374611936  
 Rule 164 ]['49'] ==> ['40', '39'] conf: 0.14577640489485566 support: 0.0695893829401089 lift: 1.2447116567099734  
 Rule 165 ]['40', '39'] ==> ['49'] conf: 4.076029055690073 support: 0.0695893829401089 lift: 8.538498789346248  
 Rule 166 ]['40'] ==> ['49', '39'] conf: 0.1211134142730234 support: 0.0695893829401089 lift: 1.3053005626295529  
 Rule 167 ]['49', '39'] ==> ['40'] conf: 6.192542787286063 support: 0.0695893829401089 lift: 10.777506112469437  
 Rule 168 ]['171'] ==> ['40', '49'] conf: 0.3790446841294299 support: 0.013951905626134301 lift: 1.1526933202087113  
 Rule 169 ]['40', '49'] ==> ['171'] conf: 0.111935150051742 support: 0.013951905626134301 lift: 3.041048637461194  
 Rule 170 ]['39'] ==> ['171', '40'] conf: 0.12741679873217115 support: 0.0227994555353902 lift: 5.506404400111867  
 Rule 171 ]['171', '40'] ==> ['39'] conf: 7.7328431372549025 support: 0.0227994555353902 lift: 43.21568627450981  
 Rule 172 ]['171'] ==> ['40', '39'] conf: 0.6194144838212635 support: 0.0227994555353902 lift: 5.2888698202113895  
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 Rule 174 ]['40', '39'] ==> ['49', '33'] conf: 0.11138014527845037 support: 0.013044464609800363 lift: 1.2852452366162546  
 Rule 175 ]['33', '39'] ==> ['40', '49'] conf: 0.4121863799283154 support: 0.013044464609800363 lift: 1.2534788290610654  
 Rule 176 ]['40', '33'] ==> ['49', '39'] conf: 0.14136447449293177 support: 0.013044464609800363 lift: 1.523556487933602  
 Rule 177 ]['49', '39'] ==> ['40', '33'] conf: 0.14058679706601468 support: 0.013044464609800363 lift: 1.5235564879336023  
 Rule 178 ]['49', '33'] ==> ['40', '39'] conf: 0.1505235602094241 support: 0.013044464609800363 lift: 1.2852452366162546  
 Rule 179 ]['39'] ==> ['40', '49', '33'] conf: 0.07290015847860538 support: 0.013044464609800363 lift: 1.2638894732495283  
 Rule 180 ]['40', '49', '33'] ==> ['39'] conf: 3.1022615535889875 support: 0.013044464609800363 lift: 17.337266470009833  
 Rule 181 ]['33'] ==> ['40', '49', '39'] conf: 0.07788689468337284 support: 0.013044464609800363 lift: 1.1192353113750855  
 Rule 182 ]['40', '49', '39'] ==> ['33'] conf: 2.406682966585167 support: 0.013044464609800363 lift: 14.370008149959249  
 Rule 183 ]['40', '42'] ==> ['49', '33'] conf: 0.13545296167247384 support: 0.017638384754990924 lift: 1.5630278928069756  
 Rule 184 ]['40', '33'] ==> ['49', '42'] conf: 0.19114935464044253 support: 0.017638384754990924 lift: 1.854895663742588  
 Rule 185 ]['42', '33'] ==> ['40', '49'] conf: 0.5 support: 0.017638384754990924 lift: 1.5205243187305968  
 Rule 186 ]['40', '49'] ==> ['42', '33'] conf: 0.05363918592618144 support: 0.017638384754990924 lift: 1.520524318730597  
 Rule 187 ]['49', '42'] ==> ['40', '33'] conf: 0.17116125481563013 support: 0.017638384754990924 lift: 1.854895663742588  
 Rule 188 ]['49', '33'] ==> ['40', '42'] conf: 0.20353403141361257 support: 0.017638384754990924 lift: 1.5630278928069758  
 Rule 189 ]['42'] ==> ['40', '49', '33'] conf: 0.10542372881355931 support: 0.017638384754990924 lift: 1.8277592787027315  
 Rule 190 ]['40', '49', '33'] ==> ['42'] conf: 2.9006882989183875 support: 0.017638384754990924 lift: 17.337266470009833  
 Rule 191 ]['33'] ==> ['40', '49', '42'] conf: 0.10531662715882152 support: 0.017638384754990924 lift: 1.2338490166540472  
 Rule 192 ]['40', '49', '42'] ==> ['33'] conf: 1.9621262458471762 support: 0.017638384754990924 lift: 11.715614617940199  
 Rule 193 ]['111', '39'] ==> ['40', '49'] conf: 0.40409683426443205 support: 0.012307168784029038 lift: 1.2288781272422329  
 Rule 194 ]['40', '39'] ==> ['49', '111'] conf: 0.10508474576271187 support: 0.012307168784029038 lift: 6.259642693540999  
 Rule 195 ]['40', '111'] ==> ['49', '39'] conf: 0.6129943502824858 support: 0.012307168784029038 lift: 6.6065503570787225  
 Rule 196 ]['49', '39'] ==> ['40', '111'] conf: 0.13264058679706603 support: 0.012307168784029038 lift: 6.606550357078723

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Rule 199 ] ['40', '49', '111'] ==> ['39'] conf: 14.539170506912443 support: 0.012307168784029038 lift: 81.25345622119816  
Rule 200 ] ['111'] ==> ['40', '49', '39'] conf: 0.3938294010889292 support: 0.012307168784029038 lift: 5.659331703341483  
Rule 201 ] ['40', '49', '39'] ==> ['111'] conf: 0.44906275468622653 support: 0.012307168784029038 lift: 14.370008149959249  
Rule 202 ] ['37', '39'] ==> ['40', '49'] conf: 0.3960923623445826 support: 0.012647459165154265 lift: 1.2045361388167783  
Rule 203 ] ['40', '37'] ==> ['49', '39'] conf: 0.5519801980198019 support: 0.012647459165154265 lift: 5.9489699581205056  
Rule 204 ] ['40', '39'] ==> ['49', '37'] conf: 0.1079903147699758 support: 0.012647459165154265 lift: 6.657640664420326  
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Rule 208 ] ['40', '49', '39'] ==> ['37'] conf: 0.47840260798696 support: 0.012647459165154265 lift: 14.370008149959249  
Rule 209 ] ['39'] ==> ['40', '49', '37'] conf: 0.07068145800316956 support: 0.012647459165154265 lift: 5.490112191682316  
Rule 210 ] ['40', '49', '37'] ==> ['39'] conf: 13.898678414096917 support: 0.012647459165154265 lift: 77.67400881057269  
Rule 211 ] ['171', '39'] ==> ['40', '49'] conf: 0.3805031446540881 support: 0.013725045372050817 lift: 1.157128569600014  
Rule 212 ] ['40', '39'] ==> ['171', '49'] conf: 0.11719128329297822 support: 0.013725045372050817 lift: 6.397265346816694  
Rule 213 ] ['40', '171'] ==> ['49', '39'] conf: 0.5931372549019608 support: 0.013725045372050817 lift: 6.392540390239225  
Rule 214 ] ['49', '39'] ==> ['40', '171'] conf: 0.14792176039119806 support: 0.013725045372050817 lift: 6.392540390239226  
Rule 215 ] ['171', '49'] ==> ['40', '39'] conf: 0.7492260061919506 support: 0.013725045372050817 lift: 6.397265346816694  
Rule 216 ] ['39'] ==> ['40', '49', '171'] conf: 0.07670364500792393 support: 0.013725045372050817 lift: 5.4977181657711975  
Rule 217 ] ['40', '49', '171'] ==> ['39'] conf: 12.825203252032521 support: 0.013725045372050817 lift: 71.67479674796748  
Rule 218 ] ['171'] ==> ['40', '49', '39'] conf: 0.3728813559322034 support: 0.013725045372050817 lift: 5.358308123713618  
Rule 219 ] ['40', '49', '39'] ==> ['171'] conf: 0.5289323553382232 support: 0.013725045372050817 lift: 14.370008149959249  
Rule 220 ] ['40', '39'] ==> ['49', '42'] conf: 0.19564164648910415 support: 0.022912885662431944 lift: 1.898488448484251  
Rule 221 ] ['42', '39'] ==> ['40', '49'] conf: 0.5301837270341208 support: 0.022912885662431944 lift: 1.6123145007012103  
Rule 222 ] ['40', '42'] ==> ['49', '39'] conf: 0.1759581881533101 support: 0.022912885662431944 lift: 1.896390448361347  
Rule 223 ] ['49', '39'] ==> ['40', '42'] conf: 0.24694376528117362 support: 0.022912885662431944 lift: 1.896390448361347  
Rule 224 ] ['40', '49'] ==> ['42', '39'] conf: 0.06967919972404278 support: 0.022912885662431944 lift: 1.6123145007012103  
Rule 225 ] ['49', '42'] ==> ['40', '39'] conf: 0.22234452394056137 support: 0.022912885662431944 lift: 1.8984884484842508  
Rule 226 ] ['39'] ==> ['40', '49', '42'] conf: 0.12805071315372424 support: 0.022912885662431944 lift: 1.5001928068614392  
Rule 227 ] ['40', '49', '42'] ==> ['39'] conf: 2.0963455149501664 support: 0.022912885662431944 lift: 11.7156146179402  
Rule 228 ] ['42'] ==> ['40', '49', '39'] conf: 0.1369491525423729 support: 0.022912885662431944 lift: 1.9679604381639109  
Rule 229 ] ['40', '49', '39'] ==> ['42'] conf: 2.4042379788101056 support: 0.022912885662431944 lift: 14.370008149959249

### For 30% Random Sampled data– With minimum support threshold as 1%

-----FOR 0.01 MIN SUPPORT threshold-----

-----FOR 0.3 SAMPLE DATA-----

Frequent sets:

['243'], ['957'], ['590'], ['79'], ['741'], ['287'], ['32'], ['678'], ['19'], ['1328'], ['180'], ['2239'], ['14099'], ['20'], ['439'], ['176'], ['311'], ['12926'], ['302'], ['102'], ['162'], ['545'], ['523'], ['226'], ['1005'], ['259'], ['148'], ['480'], ['476'], ['784'], ['593'], ['50'], ['250'], ['38'], ['37'], ['124'], ['61'], ['256'], ['1394'], ['534'], ['90'], ['265'], ['16218'], ['13042'], ['15833'], ['46'], ['111'], ['825'], ['80'], ['605'], ['1147']

], ['171'], ['66'], ['238'], ['202'], ['16011'], ['33'], ['272'], ['271'], ['118'], ['77'], ['550'], ['414'], ['10'], ['549'], ['339'], ['186'], ['49'], ['42'], ['40'], ['39']] -----Length: 71

[[['49', '102'], ['40', '102'], ['287', '39'], ['40', '12926'], ['49', '226'], ['40', '1147'], ['80', '49'], ['49', '414'], ['40', '1328'], ['50', '49'], ['49', '1328'], ['40', '226'], ['40', '2239'], ['40', '439'], ['49', '439'], ['40', '111'], ['49', '111'], ['40', '311'], ['49', '311'], ['40', '148'], ['476', '49'], ['42', '66'], ['49', '148'], ['80', '40'], ['476', '40'], ['38', '39'], ['171', '49'], ['39', '37'], ['40', '37'], ['49', '37'], ['40', '90'], ['49', '90'], ['40', '256'], ['49', '256'], ['61', '40'], ['61', '49'], ['40', '534'], ['534', '49'], ['111', '39'], ['171', '39'], ['171', '40'], ['40', '16011'], ['238', '40'], ['238', '49'], ['40', '66'], ['49', '66'], ['33', '39'], ['42', '33'], ['271', '40'], ['271', '49'], ['40', '272'], ['49', '272'], ['40', '33'], ['49', '33'], ['40', '414'], ['40', '39'], ['42', '39'], ['40', '42'], ['49', '39'], ['40', '49'], ['49', '42']] -----Length: 61

[[['40', '49', '102'], ['40', '49', '226'], ['49', '111', '39'], ['40', '49', '111'], ['40', '111', '39'], ['40', '49', '311'], ['476', '49', '40'], ['49', '42', '33'], ['49', '33', '39'], ['49', '39', '37'], ['40', '49', '37'], ['40', '39', '37'], ['171', '49', '40'], ['171', '49', '39'], ['40', '49', '90'], ['171', '40', '39'], ['40', '49', '66'], ['238', '49', '40'], ['40', '42', '33'], ['40', '33', '39'], ['40', '49', '33'], ['49', '42', '39'], ['40', '49', '42'], ['40', '49', '39'], ['40', '42', '39']] -----Length: 25

[[['49', '33', '42', '40'], ['49', '40', '111', '39'], ['49', '33', '40', '39'], ['49', '40', '171', '39'], ['49', '40', '39', '37'], ['49', '42', '40', '39']] -----Length: 6

[] -----Length: 0

**Execution Time: 0:01:12.289552**

**No of Candidate sets: 16271**

**No of frequent sets: 163**

Rule 1 ] ['102'] ==> ['49'] conf: 0.5683453237410072 support: 0.014934966727162734 lift: 1.1880807083703888

Rule 2 ] ['102'] ==> ['40'] conf: 0.623021582733813 support: 0.016371748336358138 lift: 1.0864878557394098

Rule 3 ] ['39'] ==> ['287'] conf: 0.07526435828322621 support: 0.013725045372050817 lift: 5.238399336512544

Rule 4 ] ['287'] ==> ['39'] conf: 0.9552631578947369 support: 0.013725045372050817 lift: 5.238399336512545

Rule 5 ] ['12926'] ==> ['40'] conf: 0.6690821256038648 support: 0.010473381730187538 lift: 1.166812874717857

Rule 6 ] ['226'] ==> ['49'] conf: 0.5121436114044351 support: 0.018337870538415003 lift: 1.0705954975043075

Rule 7 ] ['1147'] ==> ['40'] conf: 0.6905940594059405 support: 0.010549001814882032 lift: 1.204327553947535

Rule 8 ] ['80'] ==> ['49'] conf: 0.5661157024793388 support: 0.010359951603145796 lift: 1.183419862407015

Rule 9 ] ['414'] ==> ['49'] conf: 0.5923344947735192 support: 0.012855414398064126 lift: 1.2382281629600091

Rule 10 ] ['1328'] ==> ['40'] conf: 0.6296992481203008 support: 0.012666364186327888 lift: 1.0981330419547486

Rule 11 ] ['50'] ==> ['49'] conf: 0.7749287749287749 support: 0.0102843315184513 lift: 1.6199269869835786

Rule 12 ] ['1328'] ==> ['49'] conf: 0.5601503759398496 support: 0.011267392619479734 lift: 1.1709498215979404

Rule 13 ] ['226'] ==> ['40'] conf: 0.7053854276663147 support: 0.025257108287961284 lift: 1.2301222333455555

Rule 14 ] ['2239'] ==> ['40'] conf: 0.7353535353535353 support: 0.013762855414398064 lift: 1.2823836412389755

Rule 15 ] ['439'] ==> ['40'] conf: 0.6558558558558559 support: 0.013762855414398064 lift: 1.1437475719158432

Rule 16 ] ['439'] ==> ['49'] conf: 0.5477477477477478 support: 0.011494252873563218 lift: 1.145023113534021

Rule 17 ] ['111'] ==> ['40'] conf: 0.6371061843640606 support: 0.020644283121597096 lift: 1.1110500042239666

Rule 18 ] ['111'] ==> ['49'] conf: 0.4889148191365228 support: 0.015842407743496673 lift: 1.0220375542619946

Rule 19 ] ['311'] ==> ['40'] conf: 0.7107540173053152 support: 0.021740774349667272 lift: 1.2394845212772634

Rule 20 ] ['311'] ==> ['49'] conf: 0.6489493201483312 support: 0.0198502722323049 lift: 1.356576953784624

Rule 21 ] ['148'] ==> ['40'] conf: 0.6276391554702495 support: 0.01236388384754991 lift: 1.0945404446707874

Rule 22 ] ['476'] ==> ['49'] conf: 0.6434911242603549 support: 0.01644736842105263 lift: 1.3451670292789968

Rule 23 ] ['66'] ==> ['42'] conf: 0.20945945945945946 support: 0.010549001814882032 lift: 1.228333433211482

Rule 24 ] ['42'] ==> ['66'] conf: 0.06186252771618625 support: 0.010549001814882032 lift: 1.228333433211482

Rule 25 ] ['148'] ==> ['49'] conf: 0.5681381957773513 support: 0.01119177253478524 lift: 1.1876477238317567

Rule 26 ] ['80'] ==> ['40'] conf: 0.6838842975206612 support: 0.012515124016938899 lift: 1.1926263946212876

Rule 27 ] ['476'] ==> ['40'] conf: 0.6760355029585798 support: 0.017279189352692074 lift: 1.1789388752636503  
 Rule 28 ] ['39'] ==> ['38'] conf: 0.06780012440389799 support: 0.01236388384754991 lift: 5.401137621187632  
 Rule 29 ] ['38'] ==> ['39'] conf: 0.9849397590361445 support: 0.01236388384754991 lift: 5.401137621187632  
 Rule 30 ] ['171'] ==> ['49'] conf: 0.47859495060373225 support: 0.01648517846339988 lift: 1.0004646896591456  
 Rule 31 ] ['37'] ==> ['39'] conf: 0.9490238611713666 support: 0.0330837870538415 lift: 5.2041847564296715  
 Rule 32 ] ['39'] ==> ['37'] conf: 0.18142235123367198 support: 0.0330837870538415 lift: 5.2041847564296715  
 Rule 33 ] ['37'] ==> ['40'] conf: 0.6854663774403471 support: 0.023895946763460376 lift: 1.195385385107629  
 Rule 34 ] ['37'] ==> ['49'] conf: 0.4837310195227766 support: 0.016863278886872352 lift: 1.0112012333495413  
 Rule 35 ] ['90'] ==> ['40'] conf: 0.7038019451812555 support: 0.030096793708408953 lift: 1.2273607969242943  
 Rule 36 ] ['40'] ==> ['90'] conf: 0.052485823552683636 support: 0.030096793708408953 lift: 1.2273607969242941  
 Rule 37 ] ['90'] ==> ['49'] conf: 0.7206012378426171 support: 0.030815184513006653 lift: 1.5063595904569662  
 Rule 38 ] ['49'] ==> ['90'] conf: 0.06441669301296238 support: 0.030815184513006653 lift: 1.5063595904569664  
 Rule 39 ] ['256'] ==> ['40'] conf: 0.6834061135371179 support: 0.011834543254688445 lift: 1.1917924891751084  
 Rule 40 ] ['256'] ==> ['49'] conf: 0.6921397379912663 support: 0.011985783424077434 lift: 1.4468630880803834  
 Rule 41 ] ['61'] ==> ['40'] conf: 0.6659663865546218 support: 0.011985783424077434 lift: 1.1613793348013082  
 Rule 42 ] ['61'] ==> ['49'] conf: 0.5567226890756303 support: 0.01001966122202057 lift: 1.1637845147543684  
 Rule 43 ] ['534'] ==> ['40'] conf: 0.6266094420600857 support: 0.011040532365396248 lift: 1.0927447265993109  
 Rule 44 ] ['534'] ==> ['49'] conf: 0.592274678111588 support: 0.010435571687840291 lift: 1.2381031209844513  
 Rule 45 ] ['39'] ==> ['111'] conf: 0.17271407837445577 support: 0.03149576527525711 lift: 5.33015396131576  
 Rule 46 ] ['111'] ==> ['39'] conf: 0.9719953325554259 support: 0.03149576527525711 lift: 5.330153961315759  
 Rule 47 ] ['39'] ==> ['171'] conf: 0.18432510885341075 support: 0.03361312764670296 lift: 5.3512958056586255  
 Rule 48 ] ['171'] ==> ['39'] conf: 0.9758507135016465 support: 0.03361312764670296 lift: 5.3512958056586255  
 Rule 49 ] ['171'] ==> ['40'] conf: 0.6717892425905598 support: 0.023139745916515426 lift: 1.1715338182800428  
 Rule 50 ] ['16011'] ==> ['40'] conf: 0.6596736596736595 support: 0.010700241984271022 lift: 1.1504054431655644  
 Rule 51 ] ['238'] ==> ['40'] conf: 0.6269315673289183 support: 0.02147610405323654 lift: 1.0933064811232516  
 Rule 52 ] ['238'] ==> ['49'] conf: 0.5474613686534217 support: 0.018753781004234724 lift: 1.1444244608082277  
 Rule 53 ] ['66'] ==> ['40'] conf: 0.6351351351351352 support: 0.031987295825771325 lift: 1.1076126898360845  
 Rule 54 ] ['40'] ==> ['66'] conf: 0.05578267176579191 support: 0.031987295825771325 lift: 1.1076126898360843  
 Rule 55 ] ['66'] ==> ['49'] conf: 0.5735735735735735 support: 0.028886872353297035 lift: 1.1990099489309098  
 Rule 56 ] ['49'] ==> ['66'] conf: 0.060385709769206444 support: 0.028886872353297035 lift: 1.19900994893091  
 Rule 57 ] ['39'] ==> ['33'] conf: 0.18308106987352274 support: 0.03338626739261948 lift: 1.0696108098111177  
 Rule 58 ] ['33'] ==> ['39'] conf: 0.1950519107576762 support: 0.03338626739261948 lift: 1.0696108098111177  
 Rule 59 ] ['33'] ==> ['42'] conf: 0.21802518223989398 support: 0.03731851179673321 lift: 1.2785654146076975  
 Rule 60 ] ['42'] ==> ['33'] conf: 0.2188470066518847 support: 0.03731851179673321 lift: 1.2785654146076975  
 Rule 61 ] ['271'] ==> ['40'] conf: 0.6698841698841699 support: 0.013120084694494858 lift: 1.168211560404624  
 Rule 62 ] ['271'] ==> ['49'] conf: 0.5540540540540541 support: 0.010851482153660013 lift: 1.1582059454332612  
 Rule 63 ] ['272'] ==> ['40'] conf: 0.6735668789808917 support: 0.015993647912885663 lift: 1.174633839858013  
 Rule 64 ] ['272'] ==> ['49'] conf: 0.535031847133758 support: 0.012704174228675136 lift: 1.1184415343814125  
 Rule 65 ] ['33'] ==> ['40'] conf: 0.5559973492379059 support: 0.09516787658802178 lift: 0.9696042392617787  
 Rule 66 ] ['40'] ==> ['33'] conf: 0.16596333904787025 support: 0.09516787658802178 lift: 0.9696042392617787  
 Rule 67 ] ['33'] ==> ['49'] conf: 0.527722553567484 support: 0.09032819116757411 lift: 1.1031620373658564  
 Rule 68 ] ['49'] ==> ['33'] conf: 0.18882390135946886 support: 0.09032819116757411 lift: 1.1031620373658566  
 Rule 69 ] ['414'] ==> ['40'] conf: 0.5958188153310104 support: 0.01293103448275862 lift: 1.0390489270654468  
 Rule 70 ] ['39'] ==> ['40'] conf: 0.6574746008708273 support: 0.11989564428312159 lift: 1.1465705026923145

Rule 71 ] ['40'] ==> ['39'] conf: 0.2090861136753264 support: 0.11989564428312159 lift: 1.1465705026923145  
 Rule 72 ] ['39'] ==> ['42'] conf: 0.24963715529753266 support: 0.0455232909860859 lift: 1.4639475572747547  
 Rule 73 ] ['42'] ==> ['39'] conf: 0.26696230598669624 support: 0.0455232909860859 lift: 1.463947557274755  
 Rule 74 ] ['42'] ==> ['40'] conf: 0.7620842572062085 support: 0.12995311554748942 lift: 1.32899936928589  
 Rule 75 ] ['40'] ==> ['42'] conf: 0.2266253461690624 support: 0.12995311554748942 lift: 1.3289993692858897  
 Rule 76 ] ['39'] ==> ['49'] conf: 0.5073605639643376 support: 0.09252117362371445 lift: 1.060596917145811  
 Rule 77 ] ['49'] ==> ['39'] conf: 0.19340815681315204 support: 0.09252117362371445 lift: 1.0605969171458107  
 Rule 78 ] ['49'] ==> ['40'] conf: 0.6973601011697755 support: 0.33359800362976405 lift: 1.2161268598007533  
 Rule 79 ] ['40'] ==> ['49'] conf: 0.5817618356850851 support: 0.33359800362976405 lift: 1.2161268598007533  
 Rule 80 ] ['42'] ==> ['49'] conf: 0.6073170731707318 support: 0.10356170598911071 lift: 1.2695480517878213  
 Rule 81 ] ['49'] ==> ['42'] conf: 0.2164875118558331 support: 0.10356170598911071 lift: 1.2695480517878213  
 Rule 82 ] ['102'] ==> ['40', '49'] conf: 0.40431654676258993 support: 0.010624621899576527 lift: 1.2119873091666076  
 Rule 83 ] ['40', '49'] ==> ['102'] conf: 0.07877139295024368 support: 0.010624621899576527 lift: 2.997619857191432  
 Rule 84 ] ['226'] ==> ['40', '49'] conf: 0.4002111932418163 support: 0.014330006049606776 lift: 1.1996810199319459  
 Rule 85 ] ['40', '49'] ==> ['226'] conf: 0.10733310665306585 support: 0.014330006049606776 lift: 2.997619857191432  
 Rule 86 ] ['39'] ==> ['49', '111'] conf: 0.08563134978229318 support: 0.015615547489413188 lift: 5.405197945207852  
 Rule 87 ] ['49', '111'] ==> ['39'] conf: 11.510739856801909 support: 0.015615547489413188 lift: 63.12171837708831  
 Rule 88 ] ['111'] ==> ['49', '39'] conf: 0.4819136522753792 support: 0.015615547489413188 lift: 5.208685032848071  
 Rule 89 ] ['49', '39'] ==> ['111'] conf: 0.3502247650183899 support: 0.015615547489413188 lift: 10.808336738863916  
 Rule 90 ] ['111'] ==> ['40', '49'] conf: 0.3757292882147025 support: 0.012174833635813672 lift: 1.1262935752807948  
 Rule 91 ] ['40', '49'] ==> ['111'] conf: 0.09713249461634366 support: 0.012174833635813672 lift: 2.997619857191432  
 Rule 92 ] ['39'] ==> ['40', '111'] conf: 0.11196350818992329 support: 0.02041742286751361 lift: 5.423463121991009  
 Rule 93 ] ['40', '111'] ==> ['39'] conf: 8.833333333333332 support: 0.02041742286751361 lift: 48.43956043956044  
 Rule 94 ] ['111'] ==> ['40', '39'] conf: 0.6301050175029171 support: 0.02041742286751361 lift: 5.255445443997841  
 Rule 95 ] ['40', '39'] ==> ['111'] conf: 0.27026174708293915 support: 0.02041742286751361 lift: 8.34058656575213  
 Rule 96 ] ['311'] ==> ['40', '49'] conf: 0.5253399258343633 support: 0.016069267997580156 lift: 1.5747693934565614  
 Rule 97 ] ['40', '49'] ==> ['311'] conf: 0.09169216819675848 support: 0.016069267997580156 lift: 2.9976198571914314  
 Rule 98 ] ['476'] ==> ['40', '49'] conf: 0.49260355029585795 support: 0.012590744101633394 lift: 1.476638184089862  
 Rule 99 ] ['40', '49'] ==> ['476'] conf: 0.07661793040915789 support: 0.012590744101633394 lift: 2.997619857191432  
 Rule 100 ] ['33'] ==> ['49', '42'] conf: 0.138060525734482 support: 0.023631276467029644 lift: 1.3331233240692149  
 Rule 101 ] ['49', '42'] ==> ['33'] conf: 1.6527929901423877 support: 0.023631276467029644 lift: 9.656078860898138  
 Rule 102 ] ['42'] ==> ['49', '33'] conf: 0.1385809312638581 support: 0.023631276467029644 lift: 1.5341935831170024  
 Rule 103 ] ['49', '33'] ==> ['42'] conf: 1.8878191712013395 support: 0.023631276467029644 lift: 11.070740895772289  
 Rule 104 ] ['39'] ==> ['49', '33'] conf: 0.10346257516068838 support: 0.018867211131276467 lift: 1.1454073620133471  
 Rule 105 ] ['49', '33'] ==> ['39'] conf: 2.018836333193805 support: 0.018867211131276467 lift: 11.070740895772289  
 Rule 106 ] ['33'] ==> ['49', '39'] conf: 0.11022752374641043 support: 0.018867211131276467 lift: 1.1913761945423225  
 Rule 107 ] ['49', '39'] ==> ['33'] conf: 1.85002043318349 support: 0.018867211131276467 lift: 10.808336738863915  
 Rule 108 ] ['37'] ==> ['49', '39'] conf: 0.4652928416485901 support: 0.01622050816696915 lift: 5.029041714720846  
 Rule 109 ] ['49', '39'] ==> ['37'] conf: 0.3767879035553739 support: 0.01622050816696915 lift: 10.808336738863915  
 Rule 110 ] ['39'] ==> ['49', '37'] conf: 0.08894878706199462 support: 0.01622050816696915 lift: 5.274702960124739  
 Rule 111 ] ['49', '37'] ==> ['39'] conf: 10.81390134529148 support: 0.01622050816696915 lift: 59.300448430493276  
 Rule 112 ] ['37'] ==> ['40', '49'] conf: 0.3785249457700651 support: 0.013195704779189353 lift: 1.134673893882657  
 Rule 113 ] ['40', '49'] ==> ['37'] conf: 0.1044996033095319 support: 0.013195704779189353 lift: 2.9976198571914314  
 Rule 114 ] ['37'] ==> ['40', '39'] conf: 0.6529284164859003 support: 0.02276164549304295 lift: 5.445805978940111



Rule 115 ] ['40', '39'] ==> ['37'] conf: 0.2907600126143172 support: 0.02276164549304295 lift: 8.340586565752128  
 Rule 116 ] ['39'] ==> ['40', '37'] conf: 0.12481857764876633 support: 0.02276164549304295 lift: 5.223420477301538  
 Rule 117 ] ['40', '37'] ==> ['39'] conf: 7.63132911392405 support: 0.02276164549304295 lift: 41.848101265822784  
 Rule 118 ] ['171'] ==> ['40', '49'] conf: 0.37760702524698136 support: 0.013006654567453115 lift: 1.1319223170953376  
 Rule 119 ] ['40', '49'] ==> ['171'] conf: 0.10325286183837697 support: 0.013006654567453115 lift: 2.997619857191432  
 Rule 120 ] ['39'] ==> ['171', '49'] conf: 0.08977814638191997 support: 0.016371748336358138 lift: 5.445991778690411  
 Rule 121 ] ['171', '49'] ==> ['39'] conf: 11.061926605504585 support: 0.016371748336358138 lift: 60.66055045871558  
 Rule 122 ] ['171'] ==> ['49', '39'] conf: 0.4753018660812295 support: 0.016371748336358138 lift: 5.137222621216329  
 Rule 123 ] ['49', '39'] ==> ['171'] conf: 0.3722926031875766 support: 0.016371748336358138 lift: 10.808336738863916  
 Rule 124 ] ['90'] ==> ['40', '49'] conf: 0.5490716180371353 support: 0.023480036297640654 lift: 1.6459079852483458  
 Rule 125 ] ['40', '49'] ==> ['90'] conf: 0.1281876912614757 support: 0.023480036297640654 lift: 2.9976198571914314  
 Rule 126 ] ['39'] ==> ['171', '40'] conf: 0.12419655815882233 support: 0.02264821536600121 lift: 5.3672394937655765  
 Rule 127 ] ['171', '40'] ==> ['39'] conf: 7.8807189542483655 support: 0.02264821536600121 lift: 43.21568627450981  
 Rule 128 ] ['171'] ==> ['40', '39'] conf: 0.6575192096597147 support: 0.02264821536600121 lift: 5.484095886811773  
 Rule 129 ] ['40', '39'] ==> ['171'] conf: 0.28729107537054555 support: 0.02264821536600121 lift: 8.340586565752128  
 Rule 130 ] ['66'] ==> ['40', '49'] conf: 0.41741741741741745 support: 0.02102238354506957 lift: 1.251258739188015  
 Rule 131 ] ['40', '49'] ==> ['66'] conf: 0.15096905814348863 support: 0.02102238354506957 lift: 2.997619857191432  
 Rule 132 ] ['238'] ==> ['40', '49'] conf: 0.4006622516556292 support: 0.013725045372050817 lift: 1.2010331215899446  
 Rule 133 ] ['40', '49'] ==> ['238'] conf: 0.10268616116967018 support: 0.013725045372050817 lift: 2.9976198571914314  
 Rule 134 ] ['33'] ==> ['40', '42'] conf: 0.1610337972166998 support: 0.027563520871143377 lift: 1.239168422690508  
 Rule 135 ] ['40', '42'] ==> ['33'] conf: 1.3171370381146348 support: 0.027563520871143377 lift: 7.695082921152167  
 Rule 136 ] ['42'] ==> ['40', '33'] conf: 0.1616407982261641 support: 0.027563520871143377 lift: 1.6984806640785013  
 Rule 137 ] ['40', '33'] ==> ['42'] conf: 1.7918156535558203 support: 0.027563520871143377 lift: 10.507747318235994  
 Rule 138 ] ['39'] ==> ['40', '33'] conf: 0.11486626580966204 support: 0.020946763460375075 lift: 1.2069856965172592  
 Rule 139 ] ['40', '33'] ==> ['39'] conf: 1.9161700437028206 support: 0.020946763460375075 lift: 10.507747318235994  
 Rule 140 ] ['33'] ==> ['40', '39'] conf: 0.12237685001104484 support: 0.020946763460375075 lift: 1.020694711161184  
 Rule 141 ] ['40', '39'] ==> ['33'] conf: 1.4276253547776727 support: 0.020946763460375075 lift: 8.34058656575213  
 Rule 142 ] ['33'] ==> ['40', '49'] conf: 0.35409763640379943 support: 0.06060949788263763 lift: 1.0614501062685808  
 Rule 143 ] ['40', '49'] ==> ['33'] conf: 0.5130907854471268 support: 0.06060949788263763 lift: 2.9976198571914314  
 Rule 144 ] ['49'] ==> ['40', '33'] conf: 0.12669933607334807 support: 0.06060949788263763 lift: 1.3313246088470043  
 Rule 145 ] ['40', '33'] ==> ['49'] conf: 5.026618990862137 support: 0.06060949788263763 lift: 10.507747318235994  
 Rule 146 ] ['40'] ==> ['49', '33'] conf: 0.10569695371225109 support: 0.06060949788263763 lift: 1.170143588020769  
 Rule 147 ] ['49', '33'] ==> ['40'] conf: 6.348262871494349 support: 0.06060949788263763 lift: 11.070740895772289  
 Rule 148 ] ['39'] ==> ['49', '42'] conf: 0.15135807588637779 support: 0.027601330913490624 lift: 1.4615255169926686  
 Rule 149 ] ['49', '42'] ==> ['39'] conf: 1.7608616283315077 support: 0.027601330913490624 lift: 9.656078860898138  
 Rule 150 ] ['42'] ==> ['49', '39'] conf: 0.16186252771618626 support: 0.027601330913490624 lift: 1.7494647049602348  
 Rule 151 ] ['49', '39'] ==> ['42'] conf: 1.8430731507968943 support: 0.027601330913490624 lift: 10.808336738863916  
 Rule 152 ] ['49'] ==> ['42', '39'] conf: 0.0576983876067025 support: 0.027601330913490624 lift: 1.267447637393744  
 Rule 153 ] ['42', '39'] ==> ['49'] conf: 10.508305647840533 support: 0.027601330913490624 lift: 21.966777408637878  
 Rule 154 ] ['42'] ==> ['40', '49'] conf: 0.49933481152993353 support: 0.08514821536600121 lift: 1.4968159464290698  
 Rule 155 ] ['40', '49'] ==> ['42'] conf: 0.5111640031735237 support: 0.08514821536600121 lift: 2.9976198571914314  
 Rule 156 ] ['49'] ==> ['40', '42'] conf: 0.1779955738223206 support: 0.08514821536600121 lift: 1.369690700160819  
 Rule 157 ] ['40', '42'] ==> ['49'] conf: 3.681117253418679 support: 0.08514821536600121 lift: 7.695082921152167  
 Rule 158 ] ['40'] ==> ['49', '42'] conf: 0.14849004351839643 support: 0.08514821536600121 lift: 1.4338315702718323

Rule 159 ]['49', '42'] ==> ['40'] conf: 5.53705732018985 support: 0.08514821536600121 lift: 9.656078860898138  
 Rule 160 ]['39'] ==> ['40', '49'] conf: 0.3914575990047688 support: 0.07138535995160314 lift: 1.1734410720251758  
 Rule 161 ]['40', '49'] ==> ['39'] conf: 0.5466394650345687 support: 0.07138535995160314 lift: 2.9976198571914314  
 Rule 162 ]['49'] ==> ['40', '39'] conf: 0.14922541890610178 support: 0.07138535995160314 lift: 1.2446275241969662  
 Rule 163 ]['40', '39'] ==> ['49'] conf: 3.989908546199937 support: 0.07138535995160314 lift: 8.34058656575213  
 Rule 164 ]['40'] ==> ['49', '39'] conf: 0.12448898852696821 support: 0.07138535995160314 lift: 1.345518908280039  
 Rule 165 ]['49', '39'] ==> ['40'] conf: 6.197793216183081 support: 0.07138535995160314 lift: 10.808336738863915  
 Rule 166 ]['39'] ==> ['40', '42'] conf: 0.1955214596724031 support: 0.035654869933454326 lift: 1.5045538450438511  
 Rule 167 ]['40', '42'] ==> ['39'] conf: 1.4032586558044804 support: 0.035654869933454326 lift: 7.695082921152166  
 Rule 168 ]['42'] ==> ['40', '39'] conf: 0.2090909090909091 support: 0.035654869933454326 lift: 1.7439408273845363  
 Rule 169 ]['40', '39'] ==> ['42'] conf: 1.4222642699463892 support: 0.035654869933454326 lift: 8.34058656575213  
 Rule 170 ]['40'] ==> ['42', '39'] conf: 0.06217855729922195 support: 0.035654869933454326 lift: 1.3658625277822443  
 Rule 171 ]['42', '39'] ==> ['40'] conf: 12.596345514950166 support: 0.035654869933454326 lift: 21.966777408637874  
 Rule 172 ]['40', '42'] ==> ['49', '33'] conf: 0.14634855979051498 support: 0.019018451300665457 lift: 1.6201869859102302  
 Rule 173 ]['40', '33'] ==> ['49', '42'] conf: 0.19984108065156933 support: 0.019018451300665457 lift: 1.9296812344186585  
 Rule 174 ]['42', '33'] ==> ['40', '49'] conf: 0.5096251266464032 support: 0.019018451300665457 lift: 1.5276623993589566  
 Rule 175 ]['40', '49'] ==> ['42', '33'] conf: 0.05701008727190298 support: 0.019018451300665457 lift: 1.5276623993589564  
 Rule 176 ]['49', '42'] ==> ['40', '33'] conf: 0.1836436655713764 support: 0.019018451300665457 lift: 1.9296812344186582  
 Rule 177 ]['49', '33'] ==> ['40', '42'] conf: 0.21054834658853075 support: 0.019018451300665457 lift: 1.62018698591023  
 Rule 178 ]['42'] ==> ['40', '49', '33'] conf: 0.11152993348115299 support: 0.019018451300665457 lift: 1.8401395388081936  
 Rule 179 ]['40', '49', '33'] ==> ['42'] conf: 2.813474734872115 support: 0.019018451300665457 lift: 16.49906425452277  
 Rule 180 ]['33'] ==> ['40', '49', '42'] conf: 0.1111111111111111 support: 0.019018451300665457 lift: 1.304914150384843  
 Rule 181 ]['40', '49', '42'] ==> ['33'] conf: 2.0102131438721136 support: 0.019018451300665457 lift: 11.744227353463588  
 Rule 182 ]['111', '39'] ==> ['40', '49'] conf: 0.3841536614645858 support: 0.012099213551119177 lift: 1.1515466438190372  
 Rule 183 ]['40', '39'] ==> ['49', '111'] conf: 0.10091453800063072 support: 0.012099213551119177 lift: 6.369899047829787  
 Rule 184 ]['40', '111'] ==> ['49', '39'] conf: 0.5860805860805861 support: 0.012099213551119177 lift: 6.334556330469694  
 Rule 185 ]['49', '39'] ==> ['40', '111'] conf: 0.13077237433592154 support: 0.012099213551119177 lift: 6.3345563304696935  
 Rule 186 ]['49', '111'] ==> ['40', '39'] conf: 0.7637231503579952 support: 0.012099213551119177 lift: 6.369899047829788  
 Rule 187 ]['39'] ==> ['40', '49', '111'] conf: 0.06634874559402862 support: 0.012099213551119177 lift: 5.449663426928164  
 Rule 188 ]['40', '49', '111'] ==> ['39'] conf: 14.978260869565217 support: 0.012099213551119177 lift: 82.13664596273291  
 Rule 189 ]['111'] ==> ['40', '49', '39'] conf: 0.3733955659276546 support: 0.012099213551119177 lift: 5.2307022921899415  
 Rule 190 ]['40', '49', '39'] ==> ['111'] conf: 0.45391949152542377 support: 0.012099213551119177 lift: 14.008474576271187  
 Rule 191 ]['40', '39'] ==> ['49', '33'] conf: 0.11510564490696942 support: 0.013800665456745312 lift: 1.2743047704058297  
 Rule 192 ]['33', '39'] ==> ['40', '49'] conf: 0.4133635334088335 support: 0.013800665456745312 lift: 1.2391067359851329  
 Rule 193 ]['40', '33'] ==> ['49', '39'] conf: 0.14501390544298767 support: 0.013800665456745312 lift: 1.5673591218455816  
 Rule 194 ]['49', '39'] ==> ['40', '33'] conf: 0.1491622394769105 support: 0.013800665456745312 lift: 1.5673591218455816  
 Rule 195 ]['49', '33'] ==> ['40', '39'] conf: 0.1527835914608623 support: 0.013800665456745312 lift: 1.2743047704058297  
 Rule 196 ]['39'] ==> ['40', '49', '33'] conf: 0.07567903794318889 support: 0.013800665456745312 lift: 1.2486333097451403  
 Rule 197 ]['40', '49', '33'] ==> ['39'] conf: 3.0087336244541483 support: 0.013800665456745312 lift: 16.499064254522768  
 Rule 198 ]['33'] ==> ['40', '49', '39'] conf: 0.0806273470289375 support: 0.013800665456745312 lift: 1.1294661410070652  
 Rule 199 ]['40', '49', '39'] ==> ['33'] conf: 2.3977754237288136 support: 0.013800665456745312 lift: 14.008474576271187  
 Rule 200 ]['171', '39'] ==> ['40', '49'] conf: 0.3847019122609674 support: 0.01293103448275862 lift: 1.1531900912929918  
 Rule 201 ]['40', '39'] ==> ['171', '49'] conf: 0.10785241248817408 support: 0.01293103448275862 lift: 6.5423867098330915  
 Rule 202 ]['40', '171'] ==> ['49', '39'] conf: 0.5588235294117647 support: 0.01293103448275862 lift: 6.039952883482776

Rule 203 ] ['49', '39'] ==>> ['40', '171'] conf: 0.13976297507151614 support: 0.01293103448275862 lift: 6.039952883482776  
Rule 204 ] ['171', '49'] ==>> ['40', '39'] conf: 0.7844036697247706 support: 0.01293103448275862 lift: 6.5423867098330915  
Rule 205 ] ['39'] ==>> ['40', '49', '171'] conf: 0.07091022185361809 support: 0.01293103448275862 lift: 5.4518417080944515  
Rule 206 ] ['40', '49', '171'] ==>> ['39'] conf: 14.020348837209301 support: 0.01293103448275862 lift: 76.88372093023256  
Rule 207 ] ['171'] ==>> ['40', '49', '39'] conf: 0.3754116355653129 support: 0.01293103448275862 lift: 5.25894435245307  
Rule 208 ] ['40', '49', '39'] ==>> ['171'] conf: 0.482521186440678 support: 0.01293103448275862 lift: 14.008474576271189  
Rule 209 ] ['37', '39'] ==>> ['40', '49'] conf: 0.3851428571428572 support: 0.012741984271022383 lift: 1.1545118764268716  
Rule 210 ] ['40', '37'] ==>> ['49', '39'] conf: 0.5332278481012658 support: 0.012741984271022383 lift: 5.763306140818258  
Rule 211 ] ['40', '39'] ==>> ['49', '37'] conf: 0.10627562283191422 support: 0.012741984271022383 lift: 6.302192091162483  
Rule 212 ] ['49', '37'] ==>> ['40', '39'] conf: 0.7556053811659192 support: 0.012741984271022383 lift: 6.302192091162483  
Rule 213 ] ['49', '39'] ==>> ['40', '37'] conf: 0.13771965672251738 support: 0.012741984271022383 lift: 5.763306140818258  
Rule 214 ] ['37'] ==>> ['40', '49', '39'] conf: 0.36550976138828634 support: 0.012741984271022383 lift: 5.120234199786758  
Rule 215 ] ['40', '49', '39'] ==>> ['37'] conf: 0.4883474576271186 support: 0.012741984271022383 lift: 14.008474576271187  
Rule 216 ] ['39'] ==>> ['40', '49', '37'] conf: 0.06987352270371139 support: 0.012741984271022383 lift: 5.295171714807331  
Rule 217 ] ['40', '49', '37'] ==>> ['39'] conf: 13.819484240687679 support: 0.012741984271022383 lift: 75.78223495702007  
Rule 218 ] ['40', '39'] ==>> ['49', '42'] conf: 0.19489120151371808 support: 0.02336660617059891 lift: 1.8818848111116522  
Rule 219 ] ['42', '39'] ==>> ['40', '49'] conf: 0.5132890365448506 support: 0.02336660617059891 lift: 1.5386454084255026  
Rule 220 ] ['40', '42'] ==>> ['49', '39'] conf: 0.17980797206866453 support: 0.02336660617059891 lift: 1.9434251104503637  
Rule 221 ] ['49', '39'] ==>> ['40', '42'] conf: 0.2525541479362485 support: 0.02336660617059891 lift: 1.9434251104503635  
Rule 222 ] ['40', '49'] ==>> ['42', '39'] conf: 0.07004420265215913 support: 0.02336660617059891 lift: 1.5386454084255023  
Rule 223 ] ['49', '42'] ==>> ['40', '39'] conf: 0.22562979189485213 support: 0.02336660617059891 lift: 1.8818848111116524  
Rule 224 ] ['39'] ==>> ['40', '49', '42'] conf: 0.12813601492846777 support: 0.02336660617059891 lift: 1.5048584914867298  
Rule 225 ] ['40', '49', '42'] ==>> ['39'] conf: 2.141651865008881 support: 0.02336660617059891 lift: 11.744227353463588  
Rule 226 ] ['42'] ==>> ['40', '49', '39'] conf: 0.13702882483370288 support: 0.02336660617059891 lift: 1.9195648088992447  
Rule 227 ] ['40', '49', '39'] ==>> ['42'] conf: 2.388771186440678 support: 0.02336660617059891 lift: 14.008474576271189

0.01 % as a min support threshold	Execution Time for generating frequent itemsets.	No of frequent Candidate sets	No of frequent sets	No of Rules
Full Data	0:05:17.161543	19273	159	226
10%	0:00:19.886006	13213	168	234
20%	0:00:51.119083	15503	164	227
30%	0:01:24.571114	16425	162	226

2.7.2 A table that shows the number of **candidate frequent itemsets**, the number of **frequent itemsets**, the number of **association rules**, and the **execution time** of each algorithm when running on the given dataset with each of the **three support thresholds**.

<b>0.01 % as a min support threshold</b>	<b>Execution Time for generating frequent itemsets.</b>	<b>No of frequent Candidate sets</b>	<b>No of frequent sets</b>	<b>No of Rules</b>
<b>Full Data</b>	0:05:17.161543	19273	159	226
<b>10%</b>	0:00:19.886006	13213	168	234
<b>20%</b>	0:00:51.119083	15503	164	227
<b>30%</b>	0:01:24.571114	16425	162	226

<b>0.02 % as a min support threshold</b>	<b>Execution Time for generating frequent itemsets.</b>	<b>No of frequent Candidate sets</b>	<b>No of frequent sets</b>	<b>No of Rules</b>
<b>Full Data</b>	0:04:54.361622	16720	55	105
<b>10%</b>	0:00:21.387907	10472	58	106
<b>20%</b>	0:00:46.757457	12428	54	105
<b>30%</b>	0:01:14.996291	13702	55	104

<b>0.05 % as a min support threshold</b>	<b>Execution Time for generating frequent itemsets.</b>	<b>No of frequent Candidate sets</b>	<b>No of frequent sets</b>	<b>No of Rules</b>
<b>Full Data</b>	0:05:00.291643	16497	16	32
<b>10%</b>	0:00:18.750025	10258	16	32
<b>20%</b>	0:00:45.776100	12309	16	32
<b>30%</b>	0:01:16.648776	13482	15	32

2.7.3 A table that shows the number of **false negative itemsets** and **false positive itemsets** when running the **Simple Randomized algorithm** with each of the three different support thresholds and each of the three different sample sizes. The false negative itemsets are the itemsets that are frequent in the whole dataset, but not frequent in a sample of the dataset. The false positive itemsets are the itemsets that are frequent in a sample of the dataset, but not frequent in the whole dataset.

0.01 - support	False positive	False Negative
0.05 - confidence		
10% sample	14	9
20% sample	22	18
30% sample	31	23

0.02 - support	False positive	False Negative
0.05 - confidence		
10% sample	2	3
20% sample	6	8
30% sample	10	12

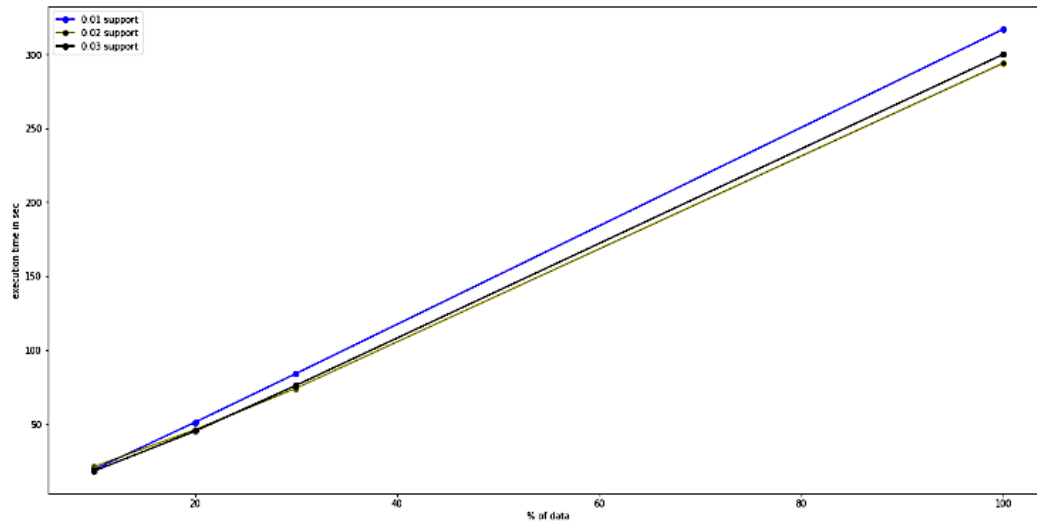
0.03 - support	False positive	False Negative
0.05 - confidence		
10% sample	0	1
20% sample	0	2
30% sample	0	3

We can see the difference. As we increase support frequency no of False + and False – are decreasing. Since accuracy is increasing.

**2.7.4** An in-depth comparison analysis of the **Simple Randomized algorithm** versus the **Apriori algorithms**. This analysis must plot and study the impact of the **sample size on the average execution time of the Simple Randomized algorithm** and the **Apriori algorithm for the minimum support threshold of 1%**.

Note that the analysis is not only to report the results you obtained, but also, very importantly, to explain why you get such results (e.g. “The Simple Randomized algorithm takes longer when the sample size increases” or “Apriori requires 15% more time than the Simple Randomized algorithm does” is not a complete analysis; you need to explain why these occur, which requires you to have a deep understanding of how the two algorithms work). See the reference list at the end of this homework assignment for a reference on the Simple Randomized algorithm.

	Execution Time for generating frequent itemsets.  (0.01 %)	Execution Time for generating frequent itemsets.  (0.02 %)	Execution Time for generating frequent itemsets.  (0.05 %)
<b>Full Data (100)</b>	0:05:17.161543	0:04:54.361622	0:05:00.291643
<b>10%</b>	0:00:19.886006	0:00:21.387907	0:00:18.750025
<b>20%</b>	0:00:51.119083	0:00:46.757457	0:00:45.776100
<b>30%</b>	0:01:24.571114	0:01:14.996291	0:01:16.648776



<http://web.cse.ohio-state.edu/dmrl/papers/ride97.pdf> (Reference Paper)

As we can see for all support frequency and for different sampled data it is taking almost same execution time. And we can also say that it is taking less time to execute as we take less probability of data. If we are getting same approximate rules with more accuracy it's preferred to take sampled data instead of full 100 % data. This can help to improve our algorithm performance without losing any accuracy.

#### 2.7.5 A detailed discussion of when (i.e. under what conditions) each of the two algorithms should be used. You must provide justifications to support your arguments.

We have presented experimental evaluation of sampling for three different sample datasets and also with full data to show that it can be an effective tool for data mining. The experimental results indicate that sampling can result in not only performance savings (such as reduced I/O cost and total computation), but also good accuracy (with high confidence) in practice. However, we note that there is a trade-off between the performance of the algorithm and the desired accuracy or confidence of the sample. With that we can claim that for practical purposes we can use sampling with high confidence for any data mining tasks which has huge datasets.

If data is having very limited transactions obviously it's always better to go for full data (without sampling). And if the data having huge no of transactions and after checking that trade-off b/w the performance and accuracy, depending of accuracy error we can choose if it satisfies our need.