## Task 1M

Given dataset

| Transaction No | Products |
|---|---|
| 1 | beer, wine, cheese |
| 2 | beer, potato chips |
| 3 | eggs, flour, butter, cheese |
| 4 | eggs, flour, butter, beer, potato chips |
| 5 | wine, cheese |
| 6 | potato chips |
| 7 | eggs, flour, butter, wine, cheese |
| 8 | eggs, flour, butter, beer, potato chips |
| 9 | wine, beer |
| 10 | beer, potato chips |
| 11 | butter, eggs |
| 12 | beer, potato chips |
| 13 | flour, eggs |
| 14 | beer, potato chips |
| 15 | eggs, flour, butter, wine, cheese |
| 16 | beer, wine, potato chips, cheese |
| 17 | wine, cheese |
| 18 | beer, potato chips |
| 19 | wine, cheese |
| 20 | beer, potato chips |

Given

Minimum support =7
Minimum confidence = 85%

### Step-1: Building frequency itemset with 1 item

| Name of Product | Frequency |
|---|---|
| beer | 11 |
| wine | 8 |
| cheese | 8 |
| potato chips | 10 |
| eggs | 7 |
| flour | 6 |
| butter | 6 |

As given minimum support is 7, we need to ignore the item sets which has frequency less than 7. Hence 1- frequency item set is as follows

| Name of Product | Frequency |
|---|---|
| beer | 11 |
| wine | 8 |
| cheese | 8 |
| potato chips | 10 |
| eggs | 7 |

**Step-2: Build frequency itemset with 2 items**

Items with which we need to build 2- frequency item set are as follows
{beer, wine, cheese, potato chips, eggs}

| Name of Product | Frequency |
|---|---|
| beer, wine | 3 |
| beer, cheese | 2 |
| beer, potato chips | 9 |
| beer, eggs | 2 |
| wine, cheese | 7 |
| wine, potato chips | 1 |
| wine, eggs | 2 |
| chesse, potato chips | 1 |
| cheese, eggs | 3 |
| potato chips, eggs | 2 |

As Given minimum support is 7, We need to ignore the item sets which has frequency less than 7. Hence 2 item Frequency set is as follows

| Name of Product | Frequency |
|---|---|
| beer, potato chips | 9 |
| wine, cheese | 7 |

**Step-3: Building association rules and finding confidence**

{beer, potato chips} and {wine, cheese}are the frequency item sets

Association rules for the above item sets are as follows

- beer -> potato chips
- potato chips -> beer
- wine -> cheese
- cheese -> wine

**Step-4: Calculating confidence,support for the above rules**

- beer -> potato chips
  confidence(beer -> potato chips) = support( beer ^ potato chips) / support(beer)
  = 9/11 = 0.8181 = 81.81 %
  As 81.81% < minimum confidence that is 85%, this association rule is not valid

- potato chips -> beer
  confidence(potato chips -> beer) = support( potato chips ^ beer) / support(potato chips)
  = 9/10 = 0.90 = 90 %
  As 90% > minimum confidence that is 85%, this association rule is valid

- wine-> cheese
  confidence(wine -> cheese) = support(wine ^ cheese) / support(wine)
  = 7/8 = 0.875 = 87.5%
  As 87.5% > minimum confidence that is 85%, this association rule is valid

- cheese -> wine
  confidence(cheese -> wine) = support( cheese ^ wine) / support(cheese)
  = 7/8 = 0.875 = 87.5 %
  As 87.5% > minimum confidence that is 85%, this association rule is valid

Valid association rules for minimum support = 7 and minimum confidence = 85% for the given data set are as follows

- potato chips -> beer
- wine-> cheese
- cheese -> wine