Q1.

Bread: 9/10

Milk: 7/10

~~Sugar:4/10~~

Eggs:7/10

Shampoo:6/10

~~Conditioner:2/10~~

{Bread}, {Milk}, {Eggs}, {Shampoo}

{Bread, Milk} {Bread, Eggs} {Bread, Shampoo} ~~{Milk, Eggs}~~ {Milk, Shampoo} ~~{Eggs, Shampoo}~~

~~{Bread, Milk, Eggs}~~ {Bread, Milk, Shampoo} ~~{Bread, Eggs, Shampoo} {Milk, Eggs, Shampoo}~~

~~{Bread, Milk, Eggs, Shampoo}~~

**Therefore, the result is,**

{Bread}, {Milk}, {Eggs}, {Shampoo}

{Bread, Milk} {Bread, Eggs} {Bread, Shampoo} {Milk, Shampoo}

{Bread, Milk, Shampoo}

Q2.

There's no need to start from one whole itemsets like {Bread}, {Milk}, {Eggs}, {Shampoo}. So, I can start from {Bread, Milk} {Bread, Eggs} {Bread, Shampoo} {Milk, Shampoo}, {Bread, Milk, Shampoo}

For {Bread, Milk}

Bread -> Milk (o)

Milk-> Bread (o)

For {Bread, Eggs}

Bread -> Eggs (x)

Eggs -> Bread (o)

For {Bread, Shampoo}

Bread -> Shampoo (x)

Shampoo -> Bread (o)

For {Milk, Shampoo}

Milk -> Shampoo (x)

Shampoo -> Milk (o)

For {Bread, Milk, Shampoo}

{Bread, Milk}->{Shampoo} has confidence = 5/7 = 71%

{Bread, Shampoo}->{Milk} has confidence = 5/5 = 100%

{Milk, Shampoo}->{Bread} has confidence = 5/5 = 100%

{Shampoo}->{Milk, Bread} has confidence = 5/6 = 83%

**Therefore, the result is,**

{Bread} -> {Milk}

{Milk} -> {Bread}

{Eggs} -> {Bread}

{Shampoo} -> {Bread}

{Shampoo} -> {Milk}

{Bread, Shampoo} -> {Milk}

{Milk, Shampoo} -> {Bread}

{Shampoo} -> {Bread, Milk}

Q3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| rank | rule(x->y) | confidence(x->y) | support(y) | Lift(x->y) |
| 1 | {Bread, Shampoo} -> {Milk} | 1 | 0.7 | 1.428571429 |
| 2 | {Shampoo} -> {Milk} | 0.833333333 | 0.7 | 1.19047619 |
| 2 | {Shampoo} -> {Bread, Milk} | 0.833333333 | 0.7 | 1.19047619 |
| 3 | {Bread} -> {Milk} | 0.777777778 | 0.7 | 1.111111111 |
| 3 | {Milk} -> {Bread} | 1 | 0.9 | 1.111111111 |
| 3 | {Milk, Shampoo} -> {Bread} | 1 | 0.9 | 1.111111111 |
| 4 | {Eggs} -> {Bread} | 0.833333333 | 0.9 | 0.925925926 |
| 4 | {Shampoo} -> {Bread} | 0.833333333 | 0.9 | 0.925925926 |

Q extra.

Explain why storing all maximal Frequent Itemsets is a compact representation of all Frequent Itemsets.

From the lecture ppt, below is Apriori principle

*“If an itemset is infrequent, then all its supersets must also be infrequent”*

That is, if an itemsets is frequent, then all its supersets must be frequent

Therefore, all maximal Frequent Itemsets includes all possible Frequent Itemsets.