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.