Q8 Apriori algorithm

a) At granularity of item_category, find frequent itemsets for the rule template :-

$\forall X \in$ transaction, buys $(X, item_1) \wedge (X, item_2) \Rightarrow$ buys $(X, item_3)$ $[s, c]$

TID	items bought
T100	Crab, Milk, Cheese, Bread
T200	Cheese, Milk, Apple, Pie, Bread
T300	Apple, Milk, Bread, Pie
T400	Bread, Milk, Cheese

Generating candidates and pruning using support $\geq 60\%$.
Since there are 4 transactions :-

Support = 60% of 4 = $\frac{60}{100} \times 4 = 2.4$

$\therefore$ min. support = 2.4

Crab	1	×	Milk, Cheese	3
Milk	4		Milk, Bread	4
Cheese	3	⇨	Cheese, Bread	3
Bread	4		⇩	
Apple	2	×	Milk, cheese, Bread	3
Pie	2	×		

Possible rules are :-

		Support	Confidence
	Milk ^ Cheese ⇒ Bread	3	$\frac{4}{4}$ = 100%
✗	Milk ^ Bread ⇒ Cheese	3	3/4 = 75%
	Cheese ^ Bread ⇒ Milk	3	4/4 = 100%
✗	Milk ⇒ Cheese ^ Bread	3	3/4 = 75%
	Cheese ⇒ Milk ^ Bread	3	3/3 = 100%
✗	Bread ⇒ Milk ^ Cheese	3	3/4 = 75%

Hence, the rules satisfying given rule are :-

Milk ^ Cheese ⇒ Bread
Cheese ^ Bread ⇒ Milk

b) At granularity brand-item, find frequent itemsets for the rule template :- (do not print any rules)

$\forall x \in$ customer, buys $(x, item_1)$ ^ buys $(x, item_2)$ ⇒ buys $(x, item_3)$

cust_id	items_bought
01	King's Crab, Sunset-Milk, Dairyland Cheese, M... Best-Bread, Apple, Wonder Bread, Tasty Pie
02	Best Cheese, Dairyland Milk, G-Apple, —, Wond...
03	Wonder Bread, Sunset Milk, Dairyland Chees...

King's Crab	1	X
Sunset Milk	2	
Dairyland Cheese	2	
Best Bread	1	X
Best Cheese	1	X
Dairyland Milk	2	
Goldenfarm Apple	1	X
Tasty Pie	2	
Wonder Bread	3	
Westcoast Apple	1	X

min_support = 60%.

Here no. of cust_id = 3

$\therefore \frac{60}{100} \times 3 = 1.8$

$\therefore$ min_support = 1.8

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Sunset Milk Dairyland Cheese	2	
Sunset Milk Dairyland Milk	1	X
Sunset Milk Tasty Pie	1	X
Sunset Milk Wonder Bread	2	
Dairyland Cheese Dairyland Milk	1	X
Dairyland Cheese Tasty Pie	1	X
Dairyland Cheese Wonder Bread	2	
Dairyland Milk Tasty Pie	2	
Dairyland Milk wonder Bread	2	
Tasty Pie Wonder Bread	2	

⇩

Sunset Milk, Dairyland Cheese, Wonder Bread	2
Dairyland Milk, Tasty Pie, wonder Bread	2

Thus the 3 frequent item sets are :-

{(Sunset Milk, Dairyland Cheese, WonderBread) (Dairyland Milk, Tasty Pie, Wonder Bread)}