Q Apply Apriori algorithm to develop association rules.

→ Given minsup = 30% minconf. = 80%
Total no. of transactions = 7

① Step 1
Calculate support for 1-itemset.

itemset	Frequency ~~Support~~	Support
noodle	4	57.14
pickle	5	71.43
milk	4	57.14
cheese	4	57.14
shoes	1	14.29
clothes	3	42.86

shoes should be removed as it is not matching min sup of 30%.

② Generate candidate 2-itemset.

itemset	Frequency	Support
noodle, pickle	3	42.86
noodle, milk	2	28.57
noodle, cheese	3	42.86
noodle, clothes	1	14.19
pickle, milk	4	57.14
pickle, cheese	2	28.57
pickle, clothes	3	42.86
milk, cheese	1	14.29
milk, clothes	3	42.86
cheese, clothes	1	14.29

Remove itemset with support < 30 to get Frequent itemset

(3) Generate Frequent 2 itemset

itemset	support
noodle, Pickle	42.86
noodle, cheese	42.86
pickle, milk	57.14
pickle, clothes	42.86
milk, clothes.	42.86

(Association rules for 2-itemset)
Now we will calculate confidence

$$C(\text{noodle} \rightarrow \text{Pickle}) = \frac{S(\text{noodle} \cup \text{Pickle})}{S(\text{noodle})}$$

$$= \frac{42.86}{57.14} \times 100$$

$$= 75$$

$C(\text{Pickle} \rightarrow \text{noodle}) = \frac{42.86}{71.43} \times 100 = 59.99$ ✗

$C(\text{noodle} \rightarrow \text{cheese}) = \frac{42.86}{57.14} \times 100 = 75$ ✗

$C(\text{cheese} \Rightarrow \text{noodle}) = \frac{42.86}{57.14} \times 100 = 75$ ✗

$C(\text{Pickle} \rightarrow \text{milk}) = \frac{57.14}{71.43} \times 100 = 80$ ✓

$C[\text{milk} \rightarrow \text{pickle}) = \frac{57.14}{57.14} \times 100 = 100$ ✓

$C(\text{Pickle} \rightarrow \text{clothes}) = \frac{42.86}{71.43} \times 100 = 60$ ✗

$C(\text{clothes} \Rightarrow \text{Pickle}) = \frac{42.86}{42.86} \times 100 = 100$ ✓

$C(\text{milk} \rightarrow \text{clothes}) = \frac{42.86}{57.14} \times 100 = 75$ ✗

$c(\text{clothes} \rightarrow \text{milk}) = \frac{42.86}{42.86} \times 100 \geq 100$ ✓

(4) Generate frequent 3-itemset

itemset	Freq.	Support
Pickle, milk, clothes	3	42.86

Association rules for 3 itemset

$c(\text{Pick} \rightarrow \text{milk, clothes}) = \frac{3}{5} \times 100 \geq 60$ ✗

$c(\text{milk} \rightarrow \text{Pick, clothes}) = \frac{3}{4} \times 100 \geq 75$ ✗

$c(\text{clothes} \rightarrow \text{Pick, milk}) = \frac{3}{3} \times 100 = 100$ ✓

$c(\text{Pick, milk} \rightarrow \text{clothes}) = \frac{3}{4} \times 100 = 75$ ✗

$c(\text{Pick, clothes} \rightarrow \text{milk}) = \frac{3}{3} \times 100 = 100$ ✓

$c(\text{clothes, milk} \rightarrow \text{Pick}) = \frac{3}{3} \times 100 = 100$ ✓

∴ Association Rules are

Pickle → milk
milk → Pickle
clothes → pickle
clothes → pickle, milk
Pickle, clothes → milk
clothes, milk → pickle
clothes → milk.