

Q1(1)

\because itemset $X \in t_{i1}, t_{i2}, \dots, t_{in}$ and $X \neq \emptyset$

$$\therefore \text{sup}(X) \geq n$$

$$\because n \geq \tau$$

$\therefore \text{sup}(X) \geq \tau$, X must be a frequent itemset

Q1(2)

X is a closed frequent itemset

Assumption: Assume we can find a superset ~~of X~~ S for X , where $\text{sup}(S) = \text{sup}(X) = n$

Proof: Let S exists in $TDBs = \{t_{i1}, t_{i2}, \dots, t_{in}\}$

~~Let~~ X is the subset of S

$\therefore X$ also exists in $TDBs = \{t_{i1}, t_{i2}, \dots, t_{in}\}$

We also know X exists in $TDB_x = \{t_{i1}, t_{i2}, \dots, t_{in}\}$, so $TDB_s = TDB_x$

and therefore $S = X$.

$\because S = X$ is in contradiction to our assumption that is S is X 's superset

\therefore We can't find a superset S for X , where $\text{sup}(S) = \text{sup}(X)$

$\therefore X$ is a closed frequent itemset.