To prove the correctness, we need to prove the Apriori algorithem is sound and complete.

It's sound since each itemset in F_i has been checked for freqency.

We can prove the alg. is complete by induction:

1. We have all 1-itemsets are in C_1 and therefore all frequent $1-itemsets$ are in F_1.
2. Assume all frenquent n-itemsets are in F_n for $n \in N$
3. $n \to n+1$

   let X be a frequent $(n+1)$-itemsets

   all n-itemsets of X are in F_n and frenqent, so $X \in C_{n+1}$, $X \in F_{n+1}$

To prove the Irredundency:

Let X be a frequent n-itemset

Then $X \notin \{F_1, \ldots, F_{n-1}, F_{n+1}, \ldots\}$, but $X \in F_n$,

Assume X appears twice in F_n

So X will appears twice in $C_n \Rightarrow$ some (n-1)-subset appears twice in F_{n-1}

In this way, some 1-itemset will appears twice in F_1 and C_1

It is contradictory with $C_1 = I$ (which is a set each item only appear once) .

According to above provement we can say the Apriori algorithem correctly and irredundantly generates all frequent itemsets.