Write a program to find how many items are duplicates (repeats) of earlier items

(a) in a given sorted nonempty list.

Let the list be $L$. Let $n$ and $j$ be natural state variables. The result will be reported as $n'$. Let's call the specification $S$, defined as

$$S \equiv n' = \phi(\$i: 1..\#L\ L i = L(i-1)) \land t' = t + \#L - 1$$

Also define

$$P \equiv 1 \leq j \leq \#L \land n' = n + \phi(\$i: j..\#L\ L i = L(i-1)) \land t' = t + \#L - j$$

The problem is solved by the refinements

$$S \Leftarrow n := 0.\ j := 1.\ P$$

$$P \Leftarrow \text{if } j = \#L \text{ then } \text{ok } \text{else if } L j = L(j-1) \text{ then } n := n + 1 \text{ else } \text{ok fi.}$$

$$j := j + 1.\ t := t + 1.\ P \text{ fi}$$

Proof: NOT YET WRITTEN

(b) in a given list.

Maybe the best way is to check if the list is nonempty, sort it, then use the solution of part (a).