You are given a nonempty sorted list of numbers. A plateau is a segment (sublist of consecutive items) of equal items. Write a program to find

(a) the length of a longest plateau.

§ Let the list be \( L \). Let \( P_{ij} \) mean that \( L[i,..j] \) is a plateau in \( L[0,..k] \). Formally,

\[
P = \{i, j \rightarrow 0 \leq i \leq j \leq \#L \land \forall i,..j : L(i) = L(j)\}
\]

Let \( Q \) say that \( p = \) (the length of a longest plateau in \( L[0,..k] \) ). Formally,

\[
Q = (\exists i, j : P_{ij} \land p = j - i) \land (\forall i, j : P_{ij} \Rightarrow p \geq j - i)
\]

The desired result is that \( p' = \) (the length of a longest plateau in \( L \) ). Let

\[
R = Q' \land k = \#L
\]

Then \( R \) implies the desired result. Now we can refine.

\[
R \iff p := 1. \ k := 1. \ Q \Rightarrow R
\]

\[
Q \Rightarrow R \iff \text{if } k = \#L \text{ then ok else } Q \land k < \#L \Rightarrow R \fi
\]

\[
Q \land k < \#L \Rightarrow R \iff \text{if } L(k-p) = L(k) \text{ then } Q \land k < \#L \land L(k-p) = L(k) \Rightarrow R
\]

\[
\text{else } Q \land k < \#L \land L(k-p) \neq L(k) \Rightarrow R \fi
\]

\[
Q \land k < \#L \land L(k-p) = L(k) \Rightarrow R \iff p := p+1. \ k := k+1. \ Q \Rightarrow R
\]

\[
Q \land k < \#L \land L(k-p) \neq L(k) \Rightarrow R \iff k := k+1. \ Q \Rightarrow R
\]

We are finished, but we can do better. We re-refine one specification.

\[
Q \land k < \#L \land L(k-p) = L(k) \Rightarrow R \iff p := p+1. \ k := k+1. \ Q \land L(k-p) = L(k-1) \Rightarrow R
\]

\[
Q \land L(k-p) = L(k-1) \Rightarrow R \iff
\]

\[
\text{if } k = \#L \text{ then ok else } Q \land k < \#L \land L(k-p) = L(k-1) \Rightarrow R \fi
\]

\[
Q \land k < \#L \land L(k-p) = L(k-1) \Rightarrow R \iff
\]

\[
\text{if } L(k-p) = L(k) \text{ then } Q \land k < \#L \land L(k-p) = L(k) \Rightarrow R
\]

\[
\text{else } Q \land k < \#L \land L(k-p) = L(k-1) \neq L(k) \Rightarrow R \fi
\]

\[
Q \land k < \#L \land L(k-p) = L(k-1) \neq L(k) \Rightarrow R \iff k := k+1. \ Q \Rightarrow R
\]

\[
Q \land k < \#L \Rightarrow R \iff k := k+1. \ Q \Rightarrow R
\]

We can step ahead \( p \) places because in a sorted list, there cannot be two separate plateaus of the same item.

(b) the number of longest plateaus.