Programming test

1. Exercise (mandatory for mark 2)

Write a generic function `Has_Repetition` which has an indefinite array type parameter (and its index and element types). (Call the array type `Vector`). The instantiation of the function will result in a function which has a `Vector` parameter and returns a logical value (which is true if there is an I for such that `v(i) = v(i+1)` holds).

Write a demo program to instantiate the generic function by a `String` array type, so you will have a `Has_Double_Letters` function. Test it for all possible cases.

2. Exercise

Write the `Most_Frequent` a generic function, which receives an array parameter and gives back the most frequent element in it (e.g. "Hello, I am going home" string has the letter 'o' as most frequent.

Implement the generic function using a `Multiplicity(Pattern)` function which counts the occurrences of Pattern in the array, then determine the maximum of such multiplicities.

Write a demo program to instantiate the generic function, and test it for all possible cases.

3. Exercise

Rewrite the earlier version by using a `Multiplicity` array, which has the same indexing like the original one. Fill in the `Multiplicity` array starting from left to right, the element with `i` index will store how many times the original `i` indexed element occurs up to the `i`th point (count backwards the occurrences of `i`th element. If there are no other such elements, then multiplicity is 1. If there is such an element then add 1 to its multiplicity). At the end find the maximum in the `Multiplicity` array and return that value.

Write a demo program to instantiate the generic function, and test it for all possible cases.