CAMBRIDGE INTERNATIONAL UNIVERSITY

COURSE OF COMPUTER SCIENCE
LABORATORY PRACTICE n. 5

Exercise 1 (1 point):

Write down a Python program in order to:

- Load an array `v` consisting of `N` positive integer numbers (`N` being a predefined constant).
- Display on a first line all the elements of the array assuming an odd value, and on the subsequent line all the elements assuming an even value.

Example: let `N` = 10 and assume that the following array has been introduced:

```
v = [4  6  5  2  8  11  10  9  28  3]
```

Then, the program should produce the following output:

```
Odd  numbers: 5 11 9 3
Even numbers: 4 6 2 8 10 28
```

Exercise 2 (2 points):

Write a Python program which:

1. Reads a positive integer number *n* (whose value is at most 100).
2. Loads an array `v` of *n* integer numbers.
3. Reads an integer number `x`.
4. Determines and prints out how many times value `x` appears in the `v` array.
5. Asks the user whether he wants to repeat the search with another value: in this case the program restarts from point 3, otherwise it terminates.

Example: the following is a possible program execution (underlined text is typed by the user):

```
Input n: 5
Input v[0]: 4
Input v[1]: 0
Input v[2]: -1
Input v[3]: 4
Input v[4]: 2

Input x: 4
Value 4 appears 2 time(s) in the array.
Would you like to continue (1=yes, 0=no)? 1
Insert x: 3
Value 3 appears 0 time(s) in the array.
Would you like to continue (1=yes, 0=no)? 1
Insert x: 2
Value 2 appears 1 time(s) in the array.
Would you like to continue (1=yes, 0=no)? 0
Program terminated.
```

Exercise 3 (2 points):

Write down a Python program which:

- Loads an array `v` and `w` of 10 integer numbers.
- Prints out the position `i` for which the absolute value of the difference between the corresponding elements `v[i]` and `w[i]` is maximum, also showing the value of such a difference.

Example: let the contents of the two arrays be the following:

```
v = [5  1  7  9 11 13  2 17 19 21]
w = [3 33 -4  5  6  0  1  1 19 17]
```

Then, the maximum difference (in absolute value) between the corresponding elements is found for position 1, i.e., between numbers 1 and 33, and it evaluates to 32.

Exercise 4 (2 points):

Write down a Python program in order to:

- Read in an array named `base` of `N` integer values (`N` is constant).
- Read in an array named `exp` of `N` positive integer values.
- Compute and display an array named `power` in which each element in position `i` is given by the power of the corresponding elements of the `base` and `exp` arrays, respectively.

Avoid using the `pow()` function to compute the results of the power operations.

Example: let the contents of the two arrays be the following:

```
base  = [ 1 -2  3  4 -5 ]
exp   = [ 4  3  2  3  2 ]
```

Then, the following array must be computed and displayed:

```
power = [ 1 -8  9 64 25 ]
```

Exercise 5 (2 points):

Write a Python program which:

- Loads an array `v` of `DIM` real numbers (`DIM` is a predefined constant).
- Indicates the starting point (index) and the length of the longest sequence of consecutive positive values in the array.

Example: let `DIM` = 11 and assume that the following array has been introduced:

```
v = [2.0 3.1 4.3 -10.6 -2.0 5.2 1.2 8.9 3.1 -9.2 8.3]
```

Then, the program should produce the following message:

```
The longest positive sequence (4 elements) starts from index 5.
```

as 5.2 – 1.2 – 8.9 – 3.1 is indeed the longest sequence of positive values contained in the array.