Time complexity: O(n^3)

Space complexity: Θ(n)

Bonus Part: I show inner results in console.

Function Explanation

LongestIncSub:

It takes 2 argument (array with numbers only and the size of the array).

My function consists of 3 nested for (2 for → subsequence checking, 1 for → printing candidate sequences) and 6 separate conditions (have little conditions).

Basic principle is based on pairwise comparison of numbers.

```
for (int i = 0; i < size; ++i) {
    for (int j = i + 1; j < size ; ++j) {
```

I have 6 big condition to achieve subsequences. Some of them are used for complex arrays (very asymmetrical distribution of large and small numbers → 5, 17, 6, 8, 18, 7, 9), some are used for simple comparisons, and one is for checking if the array has reached the end.

```
for (int x = 0; x < size; ++x) {
```

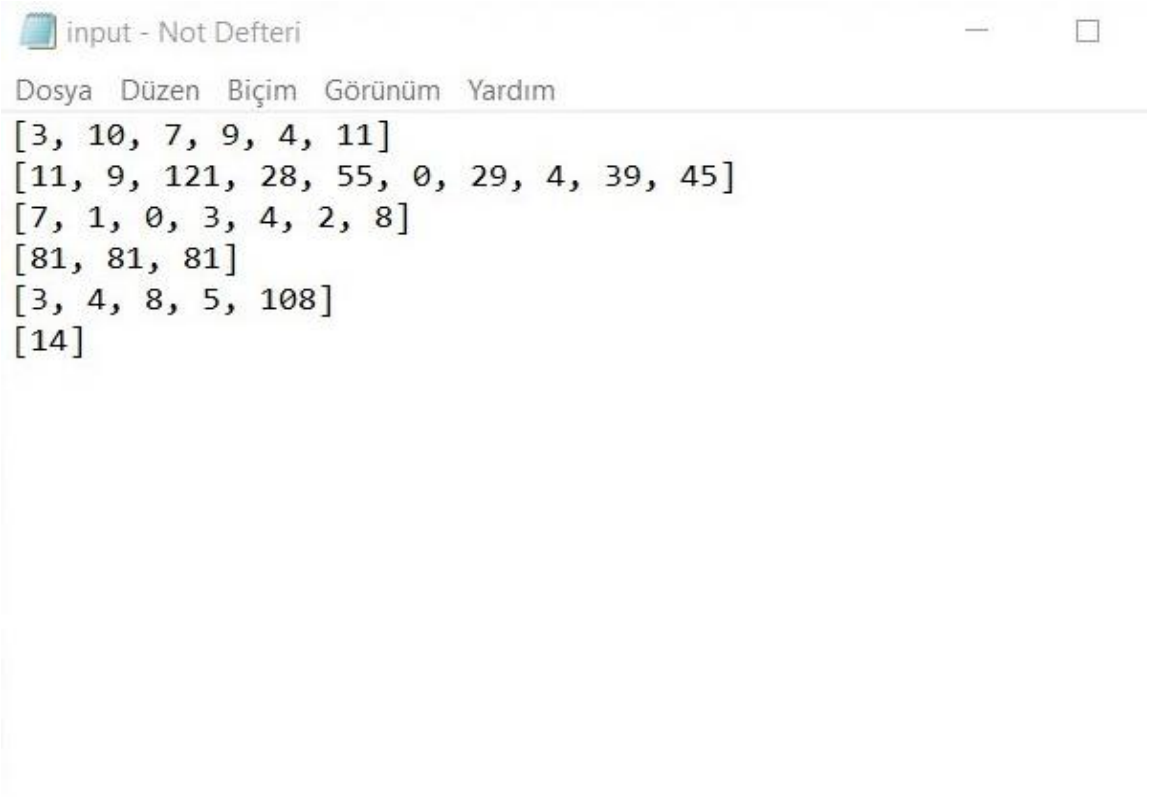
I write both subsequences and max size in third loop. I keep the previous size for max size.

Since my algorithm ignores the equality of numbers, I separate the output in 2 different ways when printing the output in the last part. While the first is normal printing, in the second, I put the first element of the array into the output array and print it.

```
if(!no_subseq){…}      #  [3, 10, 7, 9, 4, 11]
else{…}                #  [7,7,7,7,7] or [7]
```

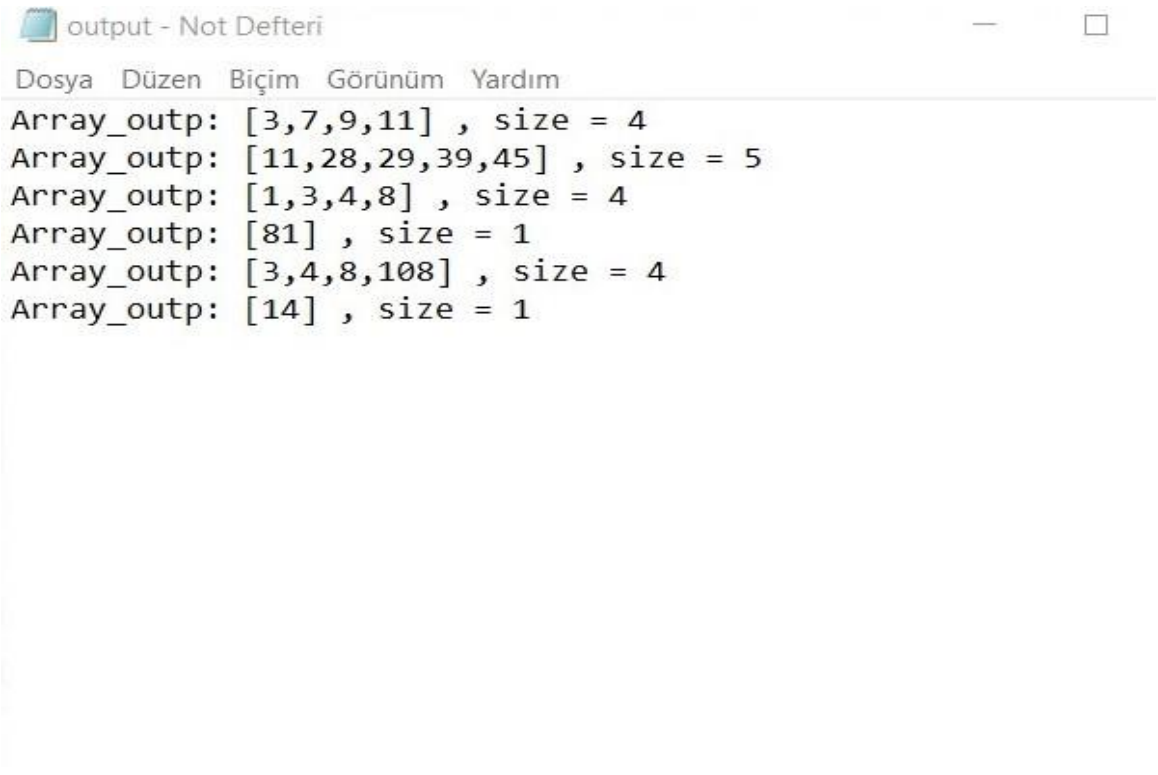
Tests Result

Input file:



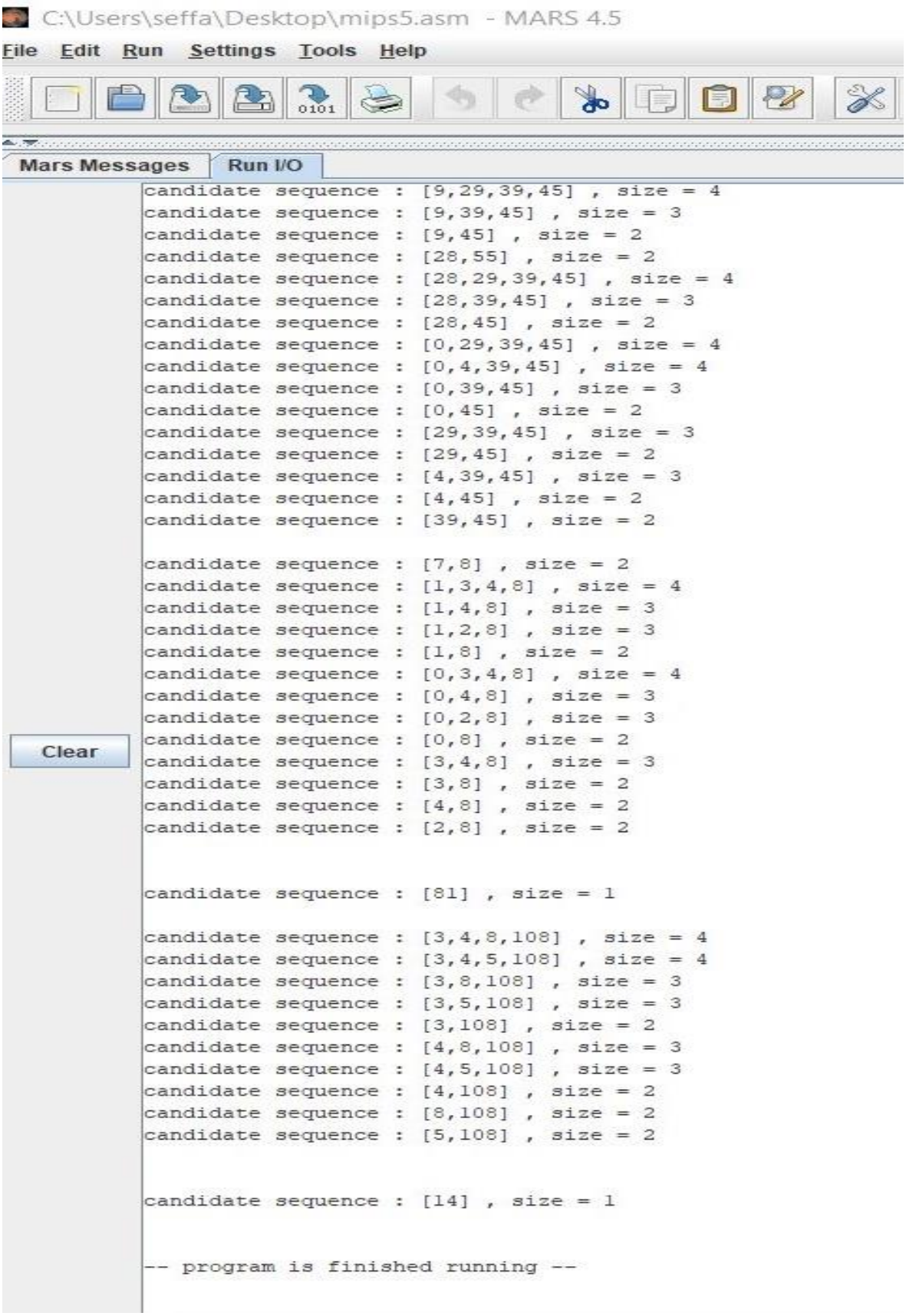
****

Output file:



Console:


C:\Users\seffa\Desktop\mips5.asm - MARS 4.5
File Edit Run Settings Tools Help
Mars Messages
Run I/O
candidate sequence : [3,10,11] , size = 3
candidate sequence : [3,7,9,11] , size = 4
candidate sequence : [3,9,11] , size = 3
candidate sequence : [3,4,11] , size = 3
candidate sequence : [3,11] , size = 2
candidate sequence : [10,11] , size = 2
candidate sequence : [7,9,11] , size = 3
candidate sequence : [7,11] , size = 2
candidate sequence : [9,11] , size = 2
candidate sequence : [4,11] , size = 2
candidate sequence : [11,121] , size = 2
candidate sequence : [11,28,55] , size = 3
candidate sequence : [11,28,29,39,45] , size = 5
candidate sequence : [11,55] , size = 2
candidate sequence : [11,29,39,45] , size = 4
candidate sequence : [11,39,45] , size = 3
candidate sequence : [11,45] , size = 2
candidate sequence : [9,121] , size = 2
candidate sequence : [9,28,55] , size = 3
candidate sequence : [9,28,29,39,45] , size = 5
candidate sequence : [9,55] , size = 2
candidate sequence : [9,29,39,45] , size = 4
candidate sequence : [9,39,45] , size = 3
candidate sequence : [9,45] , size = 2
Clear
candidate sequence : [28,55] , size = 2
candidate sequence : [28,29,39,45] , size = 4
candidate sequence : [28,39,45] , size = 3
candidate sequence : [28,45] , size = 2
candidate sequence : [0,29,39,45] , size = 4
candidate sequence : [0,4,39,45] , size = 4
candidate sequence : [0,39,45] , size = 3
candidate sequence : [0,45] , size = 2
candidate sequence : [29,39,45] , size = 3
candidate sequence : [29,45] , size = 2
candidate sequence : [4,39,45] , size = 3
candidate sequence : [4,45] , size = 2
candidate sequence : [39,45] , size = 2
candidate sequence : [7,8] , size = 2
candidate sequence : [1,3,4,8] , size = 4
candidate sequence : [1,4,8] , size = 3
candidate sequence : [1,2,8] , size = 3
candidate sequence : [1,8] , size = 2
candidate sequence : [0,3,4,8] , size = 4
candidate sequence : [0,4,8] , size = 3
candidate sequence : [0,2,8] , size = 3
candidate sequence : [0,8] , size = 2
candidate sequence : [3,4,8] , size = 3
candidate sequence : [3,8] , size = 2
candidate sequence : [4,8] , size = 2


C:\Users\seffa\Desktop\mips5.asm - MARS 4.5
File Edit Run Settings Tools Help
Mars Messages
Run I/O
Clear
candidate sequence : [9,29,39,45] , size = 4
candidate sequence : [9,39,45] , size = 3
candidate sequence : [9,45] , size = 2
candidate sequence : [28,55] , size = 2
candidate sequence : [28,29,39,45] , size = 4
candidate sequence : [28,39,45] , size = 3
candidate sequence : [28,45] , size = 2
candidate sequence : [0,29,39,45] , size = 4
candidate sequence : [0,4,39,45] , size = 4
candidate sequence : [0,39,45] , size = 3
candidate sequence : [0,45] , size = 2
candidate sequence : [29,39,45] , size = 3
candidate sequence : [29,45] , size = 2
candidate sequence : [4,39,45] , size = 3
candidate sequence : [4,45] , size = 2
candidate sequence : [39,45] , size = 2
candidate sequence : [7,8] , size = 2
candidate sequence : [1,3,4,8] , size = 4
candidate sequence : [1,4,8] , size = 3
candidate sequence : [1,2,8] , size = 3
candidate sequence : [1,8] , size = 2
candidate sequence : [0,3,4,8] , size = 4
candidate sequence : [0,4,8] , size = 3
candidate sequence : [0,2,8] , size = 3
candidate sequence : [0,8] , size = 2
candidate sequence : [3,4,8] , size = 3
candidate sequence : [3,8] , size = 2
candidate sequence : [4,8] , size = 2
candidate sequence : [2,8] , size = 2
candidate sequence : [81] , size = 1
candidate sequence : [3,4,8,108] , size = 4
candidate sequence : [3,4,5,108] , size = 4
candidate sequence : [3,8,108] , size = 3
candidate sequence : [3,5,108] , size = 3
candidate sequence : [3,108] , size = 2
candidate sequence : [4,8,108] , size = 3
candidate sequence : [4,5,108] , size = 3
candidate sequence : [4,108] , size = 2
candidate sequence : [8,108] , size = 2
candidate sequence : [5,108] , size = 2
candidate sequence : [14] , size = 1
-- program is finished running --