



İzmir Kâtip Çelebi University
Department of Engineering Sciences
COE108 C Programming
Final Examination
June 12, 2024 10:20–11:50
Good Luck!

NAME-SURNAME:

SIGNATURE:

◇ I declare hereby that I fulfilled the requirements for the attendance according to the University regulations and I accept that my examination will not be valid otherwise.

ID:

DEPARTMENT:

INSTRUCTOR:

DURATION: 90 minutes

- ◇ Answer all the questions.
- ◇ Every item on the test part (1-3) awards 4 points for each correct answer, for a maximum possible score of 40 points.
- ◇ Every item on the output part (4) awards 5 points for each correct answer, for a maximum possible score of 10 points.
- ◇ Write the code explicitly and clearly.
- ◇ You are not allowed to use any electronic equipment in the exam.

Question	Grade	Out of
1		16
2		16
3		8
4		10
5		50
TOTAL		100

PART I. MULTIPLE CHOICE QUESTIONS

1. Functions

1. Experience has shown that the best way to construct a program is from small pieces. This is called _____.
 - A. bottom up
 - B. the whole is greater than the sum of the parts
 - C. divide and conquer**
 - D. recursion
2. When a called function completes its task, it normally
 - A. terminates program execution normally
 - B. aborts program execution
 - C. logs its results
 - D. returns to the calling function**

3. The function prototype

```
double mySqrt ( int x );
```

- A. defines a function called mySqrt which takes an integer argument and returns a double**
 - B. defines a function called double which calculates square roots
 - C. defines a function called mySqrt which takes an argument of type x and returns a double
 - D. defines a function called mySqrt which takes a double as an argument and returns an integer
4. In the expression

```
int n = a + rand () % b;
```

- A. b is the shifting value
- B. a is the scaling value
- C. b is equal to the width of the desired range of integers**
- D. both (a) and (c)

2. Arrays

1. Arrays are data structures consisting of related data items of the same _____.
 - A. sort order
 - B. subscript
 - C. type**
 - D. element

2. Which statement would be used to define a 10-element integer array `c`?
- A. `Array c = int[10];`
 - B. `c = int[10];`
 - C. `int Array c[10];`
 - D. `int c[10];`**
3. Referencing elements outside the array bounds
- A. can result in changes to the value of an unrelated variable**
 - B. is impossible because C checks to make sure it does not happen
 - C. is a syntax error
 - D. enlarges the size of the array
4. Which statement is true regarding the statement
- ```
++frequency [responses [answer]] ;
```
- A. This statement increases the appropriate frequency counter depending on the value of responses[answer].**
  - B. This statement increases the appropriate answer counter depending on the value of frequency[responses].
  - C. This statement increases the appropriate responses counter depending on the value of frequency[answer].
  - D. This statement produces a syntax error because subscripts cannot be nested.

### 3. Pointers

1. Pointers are variables that contain \_\_\_\_\_ as their values.
- A. strings
  - B. flowlines
  - C. memory addresses**
  - D. directions
2. The \_\_\_\_\_, or address operator, is a unary operator that returns the address of its operand.
- A. `&`**
  - B. `&&`
  - C. `*`
  - D. `**`

## PART II. OUTPUT QUESTIONS

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4. Write the output inside the box.

1. If  $a = 7.0$ ,  $b = 7.0$  and  $c = 6.0$ , then what is printed by

```
printf("%.2f", sqrt(a + b * c));
```

|      |
|------|
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|------|

2. What value does function `mystery` return when called with a value of 4?

```
int mystery(int number)
{
 if (number <= 1) {
 return 1;
 }
 else {
 return number * mystery(number - 1);
 }
}
```

|    |
|----|
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|----|

## 5. PART III. CODING QUESTION

6. Write a function that will take an array of size 100 as an argument and will find the maximum and minimum number in the array along with their indices. The filling of the array will be done within **a function** by assigning random values (seed random number generator & the array should be filled with random numbers from 0-1000). Finding and printing out of the numbers/indices will also be done in **another function**. These functions will not return anything.

Sample Run (This is only an example):

|                                                                                        |
|----------------------------------------------------------------------------------------|
| Max. Number: 996, Index of Max. Number: 39<br>Min. Number: 3, Index of Min. Number: 12 |
|----------------------------------------------------------------------------------------|

```
1 #include <stdio.h>
2 #include <stdlib.h>
3 #include <time.h>
4 #define SIZE 100
5 void generateRandom(int arr[], int s);
6 void findMinMaxandIndexes(int arr[], int s);
7 int main()
8 {
9 srand(time(NULL));
10 int array[SIZE];
11 generateRandom(array, SIZE);
12 findMinMaxandIndexes(array, SIZE);
13 return 0;
14 }
15 void generateRandom(int arr[], int s)
16 {
17 for (size_t i = 0; i < s; i++)
18 arr[i] = rand()%1001;
19 }
20 void findMinMaxandIndexes(int arr[], int s)
21 {
22 int min, max, minIndex, maxIndex; min = arr[0]; max = arr[0];
23 for (size_t i = 1; i < s; i++)
24 {
25 if (arr[i] > max)
26 {
27 max = arr[i];
28 maxIndex = i;
29 }
30 else if (arr[i] < min)
31 {
32 min = arr[i];
33 minIndex = i;
34 }
35 }
36 printf("Max. Number: %d, Index of Max. Number: %d\n", max, maxIndex);
37 printf("Min. Number: %d, Index of Min. Number: %d\n", min, minIndex);
38 }
```