# C++ Fundamentals Exam Preparation

Write C++ code for solving the tasks on the following pages.  
Please follow the exact instructions on uploading the solutions for each task.

## Problem 1 – Sort Array in Descending Order

Write a program, use arrays that for given numbers inputed in the array, sorts them in DESCENDING Order.

WARNING: The numbers should NOT be repeated, the numbers should be ONLY POSITIVE

WARNING: DO NOT USE std::sort !

### Example

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  1 2 3 4 5 | 5 4 3 2 1 |
| 3  190 250 1000 | 1000 250 190 |
| 5  2 6 4 3 7 | 7 6 4 3 2 |

## Problem 2 – Sort Array by Order

Write a program, use an array of chars (max char 100), that by inputed characters sorts them in the following order:

* Numbers
* Small case letters
* All others (Caps letters, symbols)

### Example

|  |  |
| --- | --- |
| **Input** | **Output** |
| 5  1 2 3 h H | 1 2 3  h  H |
| 3  1 2 X | 1 2  X |
| 5  1 2 3 \* & | 1 2 3  \* & |

## Problem 3 – Sum of Numbers Above Main Diagonal

Write a program, use vector( Matrix ) that finds the sum of numbers ABOVE the diagonal.

### Example 1

**Enter size of matrix:** 2

**Enter matrix[0][0]=** 1

**Enter matrix[0][1]=** 1

**Enter matrix[1][0]=** 1

**Enter matrix[1][1]=** 1

**The MATRIX is:**

**1 1**

**1 1**

**Sum of numbers аbove diagonal is: 1**

### Example 2

**Enter size of matrix:** 3

**The MATRIX is:**

**3 3 3**

**3 3 3**

**3 3 3**

**Sum of numbers аbove diagonal is: 9**

### Example 3

**Enter size of matrix:** 4

**The MATRIX is :**

**1 2 3 4**

**1 2 3 4**

**1 2 3 4**

**1 2 3 4**

**Sum of numbers аbove diagonal is: 20**

## Problem 5 - Area and Perimeter of a Rectangle

Write a program, make a Class Rectangle. For given numbers for the sides, the program should calculate the area and the perimeter of the Rectangle.

**Examples**

|  |  |
| --- | --- |
| **Input** | **Output** |
| 3  4 | 12  14 |
| 1  2 | 2  6 |

## Problem 6 – Time Calculation

Write a program, use a class for a given **hours:minutes:second** the program should calculate the **time** in

* **hours**
* **minutes**
* **seconds**

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 1  1  1 | 1  61  3661 |
| 1  2  3 | 1  62  3723 |

## Problem 7 – Students Information

Write a program, use a class that has params:

* Student Name
* Student Surname
* Total Average

The class should have Print method that for a given object prints all the information  
Make a vector in main that for a given number ( passed thru user ) saves the objects

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  Maria  Ivanova  3.5  Dragan Ivanov  4.5 | Maria Ivanova 3.5  Dragan Ivanov 4.5 |

## Problem 8 – Total Average of Students

Write a program, use a class that has params:

* Student Name
* Student Surname
* Total Average

The class should have Print method that for a given object prints all the information  
Make a vector in main that for a given number ( passed thru user ) saves the objects  
Make a function that calculates the Total AVERAGE of ALL students

**Explanation:**

Number of students – 2

Name – Maria

Surname – Ivanova

Average – 3.5

Name – Dragan

Surname – Ivanov

Average – 4.5

**TOTAL AVERAGE** – ( 3.5 + 4.5 ) / 2 = 4

### Examples

|  |  |
| --- | --- |
| **Input** | **Output** |
| 2  Maria  Ivanova  3.5  Dragan  Ivanov  4.5 | Maria Ivanova 3.5  Dragan Ivanov 4.5  4 |