Workshop 4 – Exercises

Consider the exercises below. You need to write a program to implement the specifications outlined in the task. Don't worry if you do not manage to quickly find solutions. Ask your workshop tutor for advice. Help sheet is not available this time because a detailed explanation with example is present with the task below.

1) Bubble Sort

A Sorting Algorithm is used to rearrange a given array elements in a particular order, for example, ascending order, descending order or alphabetical order. Bubble Sort is one of the simplest sorting algorithms that works by repeatedly swapping the adjacent elements if they are in wrong order.

This is how it works.

Consider an array consisting of five arbitrary integers

Array	[0]	[1]	[2]	[3]	[4]
	3	8	2	1	5

Using a nested loop and a condition, it will sort the array.

Loop1	**Loop2**	**Condition**	**Array**				
i=0 till i<5	**j = i+1 till j<5**	**array[i]>array[j]**	**[0]**	**[1]**	**[2]**	**[3]**	**[4]**
i=0	1	3>8? No-> Do nothing	3	8	2	1	5
	2	3>2? Yes-> Swap	2	8	3	1	5
	3	2>1? Yes-> Swap	1	8	3	2	5
	4	1>5? No-> Do nothing	1	8	3	2	5
i=1	2	8>3? Yes-> Swap	1	3	8	2	5
	3	3>2? Yes-> Swap	1	2	8	3	5
	4	2>5? No-> Do nothing	1	2	8	3	5
i=2	3	8>3? Yes-> Swap	1	2	3	8	5
	4	3>5? No-> Do nothing	1	2	3	8	5
i=3	4	8>5? Yes-> Swap	1	2	3	5	8
i=4	-		1	2	3	5	8

Write a program which takes input scores of 10 students and ranks them with highest score at the top (first element of array) and least at the bottom (last element of array).

2) Swapping the values of two variables

In task 1 you have swapped two elements probably by the use of a third variable for temporary storage. Write a program which takes input in two variables, swaps the values of variables without using a third variable.

Hint: Use addition and/or subtraction of two values.

3) Sorting again (Challenge)

One of the main disadvantages of bubble sort is that it is not the fastest sorting algorithm. There are many other sorting algorithms, for example, insertion sort and merge sort which can perform the same job in comparatively lesser time period. Your task is to study other sort algorithms and redo task 1 with any other algorithm of your choice.