Assignment #2
Date Due: October 26, 2016
Total: 100 marks

1. Write a program (in a language at your choice) that performs the following tasks:

    (a) (10 marks) sorts an array of integers using Merge-Sort;

    (b) (10 marks) sorts an array of integers using Insertion-Sort;

    (c) (10 marks) sorts an array of integers using Selection-Sort;

    (d) (10 marks) sorts an array of integers using Quick-Sort(dumb version: the pivot is always the first element);

    (e) (10 marks) sorts an array of integers using Heap-Sort;

    (f) (10 marks) sorts an array of integers using the improved version of Bubble-Sort;

    (g) (10 marks) for each sorting algorithms above we have a counter for counting steps;

    (h) (10 marks) the main algorithm has as input an arbitrary array and as output the sorted array, using each of the 6(six) algorithms above, together with the corresponding running time (number of steps).

    (i) (10 marks running and testing) generate a file of $3 \cdot 10^6$ integers and execute each sorting algorithm on this file. Give the running time in ms in each case. For this part you should write a **short** program that generates the file. You must be able to generate three types of files, two already sorted (one in ascending order the other in descending order) and another one where numbers are randomly generated.

    (j) (20 marks) Summarize your results and present your conclusion about your experiment and the theoretical bounds.[1].

    The programs and data (without the big file) should be archived and compressed in a file, then uploaded to moodle before the due date. Please include the running screens (a demonstration of your program), preferably in text format.

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[1]This part can be submitted on paper