CS 340
Assignment 3 - Programming Part
Total: 70 pts

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The goal here is a comparative experimental study, in terms of running time, of the following 4 sorting algorithms.

- Insertion Sort
- Mergesort
- Quicksort
- Quick-insertion: when Quicksort is called on a subarray with fewer than k elements, let it simply return without sorting the subarray. After the top-level call to Quicksort returns, run Insertion Sort on the entire array to finish the sorting process. This will allow to improve the running time of Quicksort in practice by taking advantage of the fast running time of Insertion Sort when its input is "nearly" sorted.

1. Implement the 4 algorithms above within the same program. The input and output are described as follows.

   Input: 2 parameters N (number of random naturals to sort) and K (used by Quick-insertion).

   Output: Display the list of N randomly generated naturals. For each algorithm display the list of sorted numbers + corresponding running time.

2. Find the pair of values (N, K) in each of the following scenarios, and record it in the README file.

   (a) Quick-insertion outperforms all the other algorithms.

   (b) Insertion Sort outperforms all the other algorithms.

   (c) Quicksort outperforms all the other algorithms.

Marking scheme

1. Readability : 10 pts
2. Compiling and execution process : 10 pts
3. Correctness : 50 pts

Hand in

Using UR Courses, submit all source files in one single zip file named: **assign3username.zip**. Your source files should include the following:

1. README file listing your name and ID #, the compiling and execution commands of your program on Titan, and the pairs (N, K) stated above. Any requirement regarding the input format should also be listed.
2. A screenshot showing your command line for execution and the execution results for different examples.
3. headers (.h)
4. implementations (.cpp)
5. the Makefile :
   - should be named "**makefile**". In the makefile, the generated executable should be named : "**assign3username**"

You can give any name to your source files. The marker will run "**make**" to compile your program and "**assign3username**" to execute it.