Assignment 3

- Due by 26th October, 2020, 5pm IST.
- To be submitted to the following email address: office.of.gr@gmail.com
- The subject of the email should be: Assignment Number [3]: Algorithms, 2020
- Please mention your name and roll number.
- Topic: Sorting

1. Show that the running time of the merge-sort algorithm on n-element sequence is $O(n \log n)$, even when n is not a power of 2.

2. Consider a modification of the deterministic version of the quick-sort algorithm where we choose the element at index $\lfloor n/2 \rfloor$ as our pivot. Describe the kind of sequence that would cause this version of quick-sort to run in $\Omega(n^2)$ time.

3. Describe and analyze an efficient method for removing all duplicates from a collection A of n elements.

4. Given an array A of n integers in the range [0, n^2 - 1], describe a simple method for sorting A in $O(n)$ time.

5. Show that quicksort's best-case running time is $\Omega(n \log n)$.