**LAB 6: Recursive Algorithms**

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| **Instructor:** | Dr. Salama A. Mostafa |
| **Duration:** | 1 hour and 50 minutes |
| **Laboratory:** | Online |
| **Tools/Software:** | Lab computer, Word |
| **References:** | 1. Conte, S. D., & De Boor, C. (2017). Elementary numerical analysis: an algorithmic approach. Society for Industrial and Applied Mathematics. 2. Koren, I. (2018). Computer arithmetic algorithms. CRC Press. 3. Seaver, N., Vertesi, J., & Ribes, D. (2019). Knowing algorithms. In digitalSTS (pp. 412-422). Princeton University Press. 4. Puntambekar, A. A. (2020). Analysis and design of algorithms. Technical Publications. 5. Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2022). Introduction to algorithms. MIT press. |
| **Report** | 1. This task is done **by a group of FOUR students.** 2. The answers are discussed with your group members. 3. Send me the answer sheet to my email **Dr.Salama.Mostafa@gmail.com** 4. The email’s subject and file name have the following format **BIE20303-S3-LAB1-MatricNo-MatricNo-MatricNo-MatricNo** |

Q1) Find time complexity functions T(n) for Algorithms a, b, and c.

1. Give a recursive algorithm for a binary search.
2. Give a recursive algorithm for computing an, where a is a nonzero real number and n is a non-negative integer.
3. Give a recursive algorithm for computing the greatest common divisor (gcd) of two non-negative integers a and b with a < b.

Q2) Find the order of each of the algorithms, 𝚯(n) in a, b, and c.

Q3) Write the iterative algorithms of a, b, and c.

Q4) Trace algorithm c when it finds gcd(12,17). Show all the steps used by the algorithm.

Q5) Give a recursive algorithm for finding the maximum of a finite set of integers, making use of the fact that the maximum of n integers is the larger of the last integer in the list and the maximum of the first n − 1 integer in the list.