# BAHRIA UNIVERSITY,
# (Karachi Campus)

*Department of Software Engineering*

**Assignment #01– Spring 2022**

| | | | |
|---|---|---|---|
| COURSE TITLE: | **D&AA** | COURSE CODE: | **CSC-321** |
| Class: | **BSE 4** | Shift: | **Morning** |
| Course Instructor: | **ENGR. BUSHRA FAZAL KHAN** | Assignment Date: | **17-Apr-2022** |
| Max. Marks: | **5 Points(CLO4)** | Assignment Due: | **25-Apr-2022** |

1) Consider the following version of an important algorithm (1)

**ALGORITHM** *GE(A*[0..*n* − 1, 0..*n*]*)*

//Input: An *n* × *(n* + 1*)* matrix *A*[0..*n* − 1, 0..*n*] of real numbers

**for** *i* ←0 **to** *n* − 2 **do**

**for** *j* ←*i* + 1 **to** *n* − 1 **do**

**for** *k*←*i* **to** *n* **do**

*A*[*j*, *k*]←*A*[*j*, *k*]− *A*[*i*, *k*] ∗ *A*[*j*, *i*]/ *A*[*i*, *i*]

What is the efficiency class of this algorithm?

2) Solve the following recurrence relations using Master Theorem. (2)

a. $x(n) = 9x(n/3) + 5$ for $n > 1$, $x(1) = 0$

b. $x(n) = x(n/2) + n$ for $n > 1$, $x(1) = 1$

c. $x(n) = x(n/3) + 1$ for $n > 1$, $x(1) = 1$

d. $x(n) = 4x(n/2) + n^2$ for $n > 1$, $x(1) = 1$

3) Consider the following recursive algorithm. (2)

**ALGORITHM** *Q(n)*

//Input: A positive integer *n*

**if** *n* = 1 **return** 1

**else return** *Q(n* − 1*)* + 2 ∗ *n* – 1

a. Draw a tree of recursive calls for this algorithm and compute its time complexity using Tree method.

b. Compute complexity using induction method