

*Pray for the safety of humanity.  
Pray for all the Muslims and Pakistanis wherever they are.  
Pray for our university, staff and students.*

**Instructions:**

*This is an open-book take-home mid-term assignment, to be submitted till Monday, April 26<sup>th</sup>, 2020. You may consult the textbook, your notes, and any material posted on SIC. No other sources of information are allowed, including friends, classmates, materials from other classes, tutors, etc. Please write your solutions as clearly and neatly as possible. Also, show all your work, preferably with explanations for each step. If you are asked to do a problem a specific way (for example, “use the standard matrix representation. . .”), then you will receive no credit for doing it any other way. You will also receive no credit for answers without sufficient work to produce them. Attempt all questions. Answers copied will both be marked zero. Late submission will not be accepted and marked zero.*

**How to Submit?**

- 1. Write your names and Ids at the top of answer sheet.**
- 2. Scan / Take Photo of each paper and save each photo with a number. E.g. photo of paper 1 of answer sheet be saved with name 1.jpg, then 2.jpg and so on.**
- 3. Put all answer photos in a word file by simply copy and pasting images, name the document with subject name, your name and id e.g. LA\_Ali\_12345.**
- 4. You will be provided upload link on sic to submit your answers. Go to Lectures section and click on Upload Assignment and upload your answers document file in the subject. Different formats are mentioned for uploading assignment, student can choose any one of them.**
- 5. Due date and remaining time will be shown on the same window.**

Q. No. 1 Consider the given below matrix as the augmented matrix of a linear system. Explain in your words the next elementary row operation that should be performed in order to solve this system. Where ID3 is the 3<sup>rd</sup> digit in your ID and ID\_last is the last digit of your ID in inverse e.g. if your ID is 12345 then  $-ID\_last = -5$ .

$$\begin{bmatrix} 1 & ID3 & 3 & 0 & 5 \\ 0 & 1 & -ID\_Last & 0 & 7 \\ 0 & 0 & 1 & 0 & -6 \\ 0 & 0 & 0 & 1 & ID3 \end{bmatrix}$$

Q. No. 2

(a) Find the elementary row operation that transforms the first matrix into second and reverse row operation that transforms the second matrix into first

$$\begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 2 & -5 & -1 \end{bmatrix}, \begin{bmatrix} 1 & 3 & -1 & 5 \\ 0 & 1 & -4 & 2 \\ 0 & 0 & 3 & -5 \end{bmatrix}$$

(b) Given below are some matrices. Find whether these are in the forms written in front of them or not. Explain in your own words for each of the selection in detail.

a.  $\begin{bmatrix} e & 0 & 0 & 0 \\ 0 & \Pi & 0 & 0 \\ 0 & 0 & -\Pi & 0 \\ 0 & 0 & 0 & e \end{bmatrix}$  is in echelon form

b.  $\begin{bmatrix} 1 & 0 & \Pi \\ 0 & 1 & e \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$  is in echelon form

c.  $\begin{bmatrix} 5 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 4 \end{bmatrix}$  is in reduced row echelon form

d.  $\begin{bmatrix} 1 & 0 & 0 & 7 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 4 \end{bmatrix}$  is in reduced row echelon form

Q. No. 3

- (a) The row echelon form is used to solve the system of linear equations. What is the difference between the row echelon and reduced row echelon form? What is the practical use of reduced row echelon form? Give one example.
- (b) Find an echelon form for the below matrix using row operations. Where ID2 is 2<sup>nd</sup> digit in your ID e.g. if your ID is 12345 ID2 = 2, ID3=3, ID\_first\_last is the first and last digit of your ID i.e.15

$$\begin{bmatrix} 1 & \text{ID2} & 8 \\ 2 & 8 & -1 \\ -\text{ID3} & 0 & 0 \\ 1 & -4 & \text{ID\_First\_Last} \end{bmatrix}$$