MA2.101 Linear Algebra
Spring'24

Assignment 2

Deadline: 18th January, 11:59pm

Instructions:

1) This assignment consists of 5 problems. Q2, Q3 and Q5 are compulsory. However, there is a **choice** between Q1 and Q4. Thus, **only one** of Q1 and Q4 has to be attempted.
2) In case you attempt both Q1 and Q4, only the question which has been answered first would be considered.
3) Mention all assumptions while answering the questions.
4) Be clear in your arguments. Vague arguments shall not be given full credit.
5) Only Handwritten Submissions are allowed. Scan and upload it on moodle.

Problems:

1. Prove that each field of characteristic zero contains a copy of the rational number field.

2. To each elementary row operation e, there corresponds an elementary row operation e_1 such that

$$e_1(e(A)) = e(e_1(A)) = A$$

   for any matrix A,

   Here e_1 is the same type of operation as e.

3. Find whether the given system of linear equations are equivalent or not :

   (a)
   - x+2y=18, -x+11y=23
   - -2x+9y=5, 8x-10y=62

   (b)
   - x+y+z=6, y+2z=5, x+3z=6
   - 3x+2y-z=12, 3x+y-z=10, y+z=3
   - x+y-z=4, 2x+y=8, x-z=2

4. Prove that every matrix has a row reduced form.

5. Prove that every m $\times$ n matrix A is row equivalent to a row reduced echelon matrix.