

Worksheet 1, Math 1553

Sections from Lay 5th edition: 1.1, 1.2

Welcome to Math 1553 Recitation!

Recitations are meant for students to complete additional exercises, with a TA and other students, on topics recently covered in lecture. Recitations are meant to be

- active: students should be solving exercises themselves during recitations
- collaborative: students are encouraged to work together during recitation, to present their solutions on the board, and to ask for help from the TA

Each worksheet provides exercises for one recitation.

- There may not be time in recitation to complete all exercises.
- Students are expected to be able to solve all worksheet exercises.

Students are also encouraged to seek help from TAs, their instructor, and other students if they have any questions on any of the worksheet exercises. All questions are numbered, so students can more easily refer to them outside of recitation, in Piazza, in office hours, and so on.

Exercises

1. Determine whether each of the following augmented matrices are in reduced row echelon form (RREF). If so, write the solution. If not, use row operations to change the matrix to RREF and then state the solution.

$$A = \left[\begin{array}{ccccc|c} 1 & 2 & 0 & 3 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 5 \\ 0 & 0 & 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array} \right], \quad B = \left[\begin{array}{cccc|c} 1 & 0 & 0 & 1 & 3 \\ 0 & 1 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & -2 & 2 \end{array} \right]$$

2. Indicate whether the statement true or false. If it is true, in one or two sentences, explain why. If false, give a counter example or explain why in one or two sentences.
 - (a) If a matrix is reduced to RREF by two different sequences of row operations, then the resulting matrices will be different.
 - (b) If the RREF form of a matrix has a row of zeros, then the system has infinitely many solutions.
 - (c) If there are more unknowns than equations, then the system cannot have a unique solution.
 - (d) If there are more equations than unknowns, then the system cannot have a unique solution.
 - (e) If a linear system of n equations in n unknowns has RREF form with n leading 1's, then the system has a unique solution.
3. Use the Gauss-Jordan elimination method to solve the following system of equations, or explain why a solution does not exist. You should continue the row operations until you obtain a matrix in RREF.

$$\begin{aligned}x_1 + x_2 + x_3 - x_4 &= 3 \\2x_1 + 3x_2 + x_3 - 5x_4 &= -9 \\x_1 + 3x_2 - x_3 - 6x_4 &= 7\end{aligned}$$