Linear Algebra

Assignment 1 MATH 2318 (Fall 2022)

Deadline: Wednesday August 31st, 11:59pm.

Policy to turn in assignment:

- Assignment should be submitted via BlackBoard.
- Student needs to turn in their assignment as a single PDF file.
- No email or late submission will be accepted.

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4 points 1. Solve the linear system of equations

$$\begin{array}{rcrcrcr} 2x_1 & + & x_2 & + & x_3 & = & -2 \\ 2x_1 & - & x_2 & + & 3x_3 & = & 6 \\ 3x_1 & - & 5x_2 & + & 4x_3 & = & 7 \end{array}$$

by writing out the augmented matrix of the system and carrying it to Reduced Echelon Form (REF) using Elementary Row Operations (EROs). Recall that no more than one operation should be performed on the same row at any step. Verify your answer by substituting the values you found for x_1, x_2 and x_3 in the linear system.

3 points 2. The REF of the augmented matrix of a linear system of three equations in six variables is given by

$$\left[\begin{array}{cccccc|c} 0 & 1 & 0 & 3 & 0 & 2 & -5 \\ 0 & 0 & 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right].$$

State which of the variables are free and which are basic. What is the solution of the system?

5 points 3. Consider the linear system

$$\begin{array}{rcrcrcr} x_1 & + & x_2 & + & x_3 & = & a \\ x_1 & - & x_2 & & & = & 0 \\ 3x_1 & + & x_2 & + & bx_3 & = & 0 \end{array}$$

Find the values of a and b so that the linear system has:

a) No solutions.

b) Infinitely many solutions.

c) A unique solution.