

MATH1119C Tutorial 1 Worksheet

16 September 2015

1. Is $(3, 1, 2)$ a solution to the linear system below? Is $(26, 9, 0)$? Justify your answers.

$$\begin{aligned}x_1 + x_2 + 2x_3 &= 8 \\-x_1 - 2x_2 + 3x_3 &= 1 \\3x_1 - 7x_2 + 4x_3 &= 10\end{aligned}$$

2. The following two augmented matrices are in *reduced echelon form*:

$$\left[\begin{array}{cccc} 1 & 0 & 2 & -3 \\ 0 & 1 & 1 & 7 \\ 0 & 0 & 0 & 9 \end{array} \right] \quad \left[\begin{array}{ccccc} 1 & 3 & 0 & -1 & 1 \\ 0 & 0 & 1 & 4 & -2 \\ 0 & 0 & 0 & 0 & 0 \end{array} \right].$$

For each, write down

- The size of the matrix (in the form $m \times n$).
 - The number of equations and the number of variables in the corresponding linear system.
 - The solution set of the corresponding linear system (since the matrices are already in reduced echelon form, no row reduction will be necessary for this).
3. Consider the linear system

$$\begin{aligned}2x_1 + 3x_2 - x_3 &= 0 \\x_1 + 2x_2 + x_3 &= 3 \\x_1 + 3x_2 + 3x_3 &= 7\end{aligned}$$

- Write the coefficient and augmented matrices for the system.
- Row reduce the augmented matrix to *echelon form* (REF).
- Is the linear system consistent or inconsistent, based on your work in b)? If there are solutions, how many solutions will there be?

- d) Reduce the matrix you found in part b) to *reduced echelon form* (RREF) and write out the general solution based on it.
4. For the following augmented matrix, determine whether the corresponding linear system is consistent or inconsistent by row reducing. If the system has solutions, you don't have to find them, but explain how you know the solutions exist and if there is a unique solution or infinitely many.

$$\begin{bmatrix} 1 & 2 & 0 & 4 & 7 \\ 1 & 1 & 1 & -1 & 3 \\ 3 & 1 & 5 & -7 & 1 \end{bmatrix}$$