Math 1553 Quiz 2, Spring 2019   (10 points, 10 minutes)

Solutions

Show your work on problem 2 or you may receive little or no credit. RREF means reduced row echelon form.

1. (4 points) Write an augmented matrix in RREF with three pivots, corresponding to an inconsistent linear system of four equations in three variables. You do not need to show your work or justify your answer.

Solution.

Multiple possibilities. For example,

$$\left(\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right) \quad \text{or} \quad \left(\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{array}\right).$$

2. (6 points) Consider the following system of equations:

$$x - 2y + z = 2$$
$$3x - 6y + 5z = 12.$$

a) Write the augmented matrix corresponding to the system, and put it into RREF.

b) Write the solutions to the system in parametric form. Clearly indicate which variables (if any) are free.

Solution.

a)

$$\left(\begin{array}{ccc|c} 1 & -2 & 1 & 2 \\ 3 & -6 & 5 & 12 \end{array}\right) \xrightarrow{R_2 = R_2 - 3R_1} \left(\begin{array}{ccc|c} 1 & -2 & 1 & 2 \\ 0 & 0 & 2 & 6 \end{array}\right) \xrightarrow[\text{then } R_1 = R_1 - R_2]{R_2 = R_2/2} \left(\begin{array}{ccc|c} 1 & -2 & 0 & -1 \\ 0 & 0 & 1 & 3 \end{array}\right).$$

b) $x - 2y = -1$ and $z = 3$, and y is free since there is no pivot in its column.

$$x = -1 + 2y \qquad y = y \qquad z = 3.$$