Math 1553 Quiz: §1.1

Solutions

1. [3 points] Give an example of a system of two linear equations in two variables that has no solutions.

Solution.

There are many answers. One is

$$\begin{aligned} x + y &= 1 \\ x + y &= 2. \end{aligned}$$

2. [1 point each] For each matrix, decide if it is in row echelon form (REF), reduced row echelon form (RREF), or neither. Circle the correct answer.

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix} \quad \begin{matrix} \text{none} \\ \text{REF} \\ \text{RREF} \end{matrix} \qquad \left(\begin{array}{ccc|c} 1 & 0 & 3 & 0 \\ 0 & 1 & 4 & 1 \\ 0 & 0 & 0 & 1 \end{array}\right) \quad \begin{matrix} \text{none} \\ \text{REF} \\ \text{RREF} \end{matrix} \qquad \left(\begin{array}{ccc|c} 1 & 0 & 0 & 11 \\ 0 & 0 & 1 & 13 \\ 0 & 0 & 0 & 0 \end{array}\right) \quad \begin{matrix} \text{none} \\ \text{REF} \\ \text{RREF} \end{matrix}$$

$$\begin{pmatrix} 0 & 1 & 0 & -1 \end{pmatrix} \quad \begin{matrix} \text{none} \\ \text{REF} \\ \text{RREF} \end{matrix} \qquad \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} \quad \begin{matrix} \text{none} \\ \text{REF} \\ \text{RREF} \end{matrix}$$

Solution.

The first and last matrices are not in echelon form. The second matrix is in REF. The third and fourth are in RREF.

3. [2 points] Give two different ways of making the bottom-right entry of the following matrix into 1 using a single row operation.

$$\begin{pmatrix} 3 & 0 & 2 \\ 1 & 14 & -7 \\ -2 & -2 & -3 \end{pmatrix}$$

Solution.

One possibility is to replace R_3 by $2R_1 + R_3$. Another is to divide R_3 by -3.