

Math 54 Section Worksheet 1 Solutions

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1 Warm-Up

Try to recall the following concepts *without* looking at your notes.

augmented matrix	elementary row operations	row echelon form
reduced row echelon form	pivot	consistent linear system

2 Problems

1. Mark each statement True or False.
 - (a) Every elementary row operation is reversible. **T**
 - (b) A 5×6 matrix has six rows. **F**
 - (c) A solution of a linear system involving variables x_1, \dots, x_n is a list of numbers (s_1, \dots, s_n) that makes each equation in the system a true statement when the values s_1, \dots, s_n are substituted for x_1, \dots, x_n , respectively. **T**
 - (d) Two fundamental questions about a linear system involve existence and uniqueness. **T**
2. Mark each statement True or False.
 - (a) Two matrices are row equivalent if they have the same number of rows. **F**
 - (b) Elementary row operations on an augmented matrix never change the solution set of the associated linear system. **T**
 - (c) Two equivalent linear systems can have different solution sets. **F**
 - (d) A consistent system of linear equations has one or more solutions. **T**
3. Mark each statement True or False.
 - (a) In some cases, a matrix may be row reduced to more than one matrix in reduced echelon form, using different sequences of row operations. **F**
 - (b) If one row in an echelon form of an augmented matrix is $[0 \ 0 \ 0 \ 5 \ 0]$, then the associated linear system is inconsistent. **F**
 - (c) The row echelon form of a matrix is unique. **F**
 - (d) The pivot positions in a matrix depend on whether row interchanges are used in the row reduction process. **F**

(e) Whenever a system has free variables, the solution set contains many solutions. **F**

4. Row reduce the following matrix to reduced row echelon form:

$$\begin{pmatrix} 1 & 2 & 4 & 5 \\ 2 & 4 & 5 & 4 \\ 4 & 5 & 4 & 2 \end{pmatrix}$$

5. Do the three planes $2x_1 + 4x_2 + 4x_3 = 4$, $x_2 - 2x_3 = -2$, and $2x_1 + 3x_2 = 0$ have at least one common point of intersection?
6. Suppose a 3×5 coefficient matrix for a system has three pivot columns. Is the system consistent? Why or why not?
7. Suppose a system of linear equations has a 3×5 augmented matrix whose fifth column is a pivot column. Is the system consistent? Why or why not?