<h1 style="text-align:center">Math 54 Section Worksheet 1</h1>

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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   free variables

2 Problems

1. (#23) Mark each statement True or False.

   (a) Every elementary row operation is reversible.

   (b) A 5×6 matrix has six rows.

   (c) The solution set of a linear system involving variables $x_1, \ldots, x_n$ is a list of numbers $(s_1, \ldots, s_n)$ that makes each equation in the system a true statement when the values $s_1, \ldots, s_n$ are substituted for $x_1, \ldots, x_n$, respectively.

   (d) Two fundamental questions about a linear system involve existence and uniqueness.

2. (#24) Mark each statement True or False.

   (a) Two matrices are row equivalent if they have the same number of rows

   (b) Elementary row operations on an augmented matrix never change the solution set of the associated linear system.

   (c) Two equivalent linear systems can have different solution sets.

   (d) A consistent system of linear equations has one or more solutions

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

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

4. Solve the system:

$$x_1 - 5x_2 + 4x_3 = -3$$
$$2x_1 - 7x_2 + 3x_3 = -2$$
$$-2x_1 + x_2 + 7x_3 = -1$$

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. Think of questions to ask!

3   Challenge

7. Suppose a, b, c, and d are constants such that a is not zero and the system below is consistent for all possible values of f and g. What can you say about the numbers a, b, c and d?

$$ax_1 + bx_2 = f$$
$$cx_1 + dx_2 = g$$