Review for quiz 1

2025-08-20

We have our first quiz next Wednesday, August 27th. You can expect that problem #1 will appear on the quiz exactly and that there will also be a problem very much like #2. There will very likely be a third problem that's a shorter version of something else you see on here.

This is review sheet is *longer* than the quiz will be to give you practice! It is representative of what you'll see, though, so please work it out to the best of your ability!

There is also a MyOpenMath HW over this material due on Monday, August 25.

Quiz type questions

1. Write down the precise definition of the following:

   a. Linear equation. Definition 1.1.7
   b. Reduced Row Echelon Form. Definition 1.2.5

   Note: Don't paraphrase. I've linked the exact definitions in the textbook.

2. Consider the following system:

$$\begin{aligned} -x - 2y + 2z &= -1 \\ 2x + 4y - z &= 5 \\ x + 2y &= 3 \end{aligned}$$

   a) Write the system as an augmented matrix.
   b) Find the RREF of the matrix.
   c) Use the RREF to find the solution of the system. Keep in mind that there may be one, none, or infinitely many solutions.

   Note: This is taken from Activity 1.2.2.b of section 1.2 of our textbook.

3. Row reduce the following matrix:

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$$

4. Determine if each of the following matrices is in RREF or not. For those that aren't, indicate why not.

$$A_1 = \begin{bmatrix} 1 & 0 & 0 & 0 & 3 \\ 0 & 1 & 0 & 0 & -2 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 2 & 0 & 1 & 5 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} 1 & 0 & 0 & 0 & 3 \\ 0 & 1 & 0 & 0 & -2 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 5 \end{bmatrix}$$

$$A_3 = \begin{bmatrix} 1 & 2 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & -3 \\ 0 & 0 & 1 & 0 & 4 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

$$A_4 = \begin{bmatrix} 0 & 1 & 0 & 0 & -3 \\ 2 & 0 & 0 & 0 & 6 \\ 0 & 0 & 1 & 0 & 4 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

$$A_5 = \begin{bmatrix} 1 & 0 & 2 & 0 & 0 \\ 0 & 1 & -1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

5. Exactly two of the the matrices in problem 5, it turns out, *are* in reduced row echelon form. Assume that both of those matrices are the augmented matrices of a 5×5 system and use the matrix to write down the solution of the corresponding system.