Math 210

Quiz 1   8/30/19   Name: SOLUTIONS

1. Consider the following linear system:

$$\begin{array}{ccccccccc}
x_1 & + & 5x_2 & - & 2x_3 & & & = & 0 \\
 & & -2x_2 & + & x_3 & - & x_4 & = & -1 \\
 & & & & & & x_4 & = & 5
\end{array}$$

(a) Is this system in *triangular form*, *echelon form*, or neither?

    echelon form

(b) Which variables are *leading variables*?

    x_1, x_2, x_4

(c) Which variables are *free variables*?

    x_3

(d) Find the set of solutions of the system.

$$x_4 = 5, \quad x_3 = s_1 \text{ (free parameter)}$$

Then (2nd equation):

$$-2x_2 + s_1 - 5 = -1 \implies -2x_2 = 4 - s_1$$
$$\implies x_2 = \frac{s_1 - 4}{2}$$

And (1st equation)

$$x_1 + 5\left(\frac{s_1 - 4}{2}\right) - 2s_1 = 0$$
$$\implies x_1 = 2s_1 - 5\left(\frac{s_1 - 4}{2}\right) = \frac{4s_1 - 5s_1 + 20}{2}$$
$$= \frac{20 - s_1}{2}$$