Read chapter 1.1 and the beginning of chapter 1.2. We say a linear system is CONSISTENT if it has at least one solution.

Answer the questions below. The test on Friday will be very similar to these questions. If you get stuck, you can ask for help during the werkcollege before the test.

4. Find the point of intersection of the lines $x_1 + 2x_2 = -13$ and $3x_1 - 2x_2 = 1$

Determine if the systems in Exercises 15 and 16 are consistent. Do not completely solve the systems.

That is, have at least one solution

15.
$$x_1 - 6x_2 \qquad\qquad\quad = 5$$
$$x_2 - 4x_3 + \quad x_4 = 0$$
$$-x_1 + 6x_2 + \quad x_3 + 5x_4 = 3$$
$$-x_2 + 5x_3 + 4x_4 = 0$$

18. 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? Explain.

In Exercises 23 and 24, key statements from this section are either quoted directly, restated slightly (but still true), or altered in some way that makes them false in some cases. Mark each statement True or False, and *justify* your answer. (If true, give the approximate location where a similar statement appears, or refer to a definition or theorem. If false, give the location of a statement

24. 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.

In Exercises 1 and 2, determine which matrices are in reduced echelon form and which others are only in echelon form.

1. a. $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$ b. $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ c. $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ d. $\begin{bmatrix} 1 & 1 & 0 & 1 & 1 \\ 0 & 2 & 0 & 2 & 2 \\ 0 & 0 & 0 & 3 & 3 \\ 0 & 0 & 0 & 0 & 4 \end{bmatrix}$

Row reduce the matrices in Exercises 3 and 4 to reduced echelon form. Circle the pivot positions in the final matrix and in the original matrix, and list the pivot columns.

3. $\begin{bmatrix} 1 & 2 & 4 & 8 \\ 2 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \end{bmatrix}$

4. $\begin{bmatrix} 1 & 2 & 4 & 5 \\ 2 & 4 & 5 & 4 \\ 4 & 5 & 4 & 2 \end{bmatrix}$