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Linear Algebra pg 47 #1-21 odd

Determine if the system has a nontrivial solution.

1. $\begin{bmatrix} 2 & -5 & 8 & 0 \\ -2 & -7 & 1 & 0 \\ 4 & 2 & 7 & 0 \end{bmatrix} \sim \begin{bmatrix} 2 & -5 & 8 & 0 \\ 0 & -12 & 9 & 0 \\ 0 & 12 & -9 & 0 \end{bmatrix} \sim \begin{bmatrix} 2 & -5 & 8 & 0 \\ 0 & -12 & 9 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

Yes, this system has nontrivial solutions for each value of X_3 since X_3 is a free variable.

3. $\begin{bmatrix} -3 & 4 & -8 & 0 \\ -2 & 5 & 4 & 0 \end{bmatrix} \sim \begin{bmatrix} -3 & 4 & -8 & 0 \\ 0 & 7/3 & 2/3 & 0 \end{bmatrix}$

Yes, this system has nontrivial solutions for each value of X_3 since X_3 is a free variable.

Write the solution set of the given homogeneous system in parametric vector form.

5. $2x_1 + 2x_2 + 4x_3 = 0$
$- 4x_1 - 4x_2 - 8x_3 = 0$
$- 3x_2 - 3x_3 = 0$

$\begin{bmatrix} 2 & 2 & 4 & 0 \\ -4 & -4 & -8 & 0 \\ 0 & -3 & -3 & 0 \end{bmatrix} \sim \begin{bmatrix} 2 & 2 & 4 & 0 \\ 0 & -3 & -3 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$, x= $\begin{matrix} x_1 \\ x_2 \\ x_3 \end{matrix} = x_3 = \begin{matrix} 1 \\ -1 \\ 0 \end{matrix}$

Describe all solutions of Ax = 0 in parametric vector form, where A is row equivalent to the given matrix.

7. $\begin{bmatrix} 1 & 3 & -3 & 7 \\ 0 & 1 & -4 & 5 \end{bmatrix}$

X= $\begin{matrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{matrix} = x_3 \begin{matrix} -9 \\ 4 \\ 1 \\ 0 \end{matrix} + x_4 \begin{matrix} 8 \\ -5 \\ 0 \\ 1 \end{matrix}$

9. $\begin{bmatrix} 3 & -6 & 6 \\ -2 & 4 & -2 \end{bmatrix} \sim \begin{bmatrix} 1 & -2 & 4 \\ -2 & 4 & -2 \end{bmatrix} \sim \begin{bmatrix} 1 & -2 & 4 \\ 0 & 0 & 6 \end{bmatrix}$ X= $X_2 \begin{matrix} 2 \\ 1 \\ 0 \end{matrix}$

11. I couldn't figure out how to make a matrix that big with so many entries, but the variables that is free are x_2, x_4, x_6. The basic variables are x_1, x_3, and x_5

13. Suppose the solution set of a certain system of linear equations can be described as $x_1 = 5 + 4x_3$, $x_2 = -2 - 7x_3$, with x_3 free. Use vectors to describe this set as a line in R_3

I don't understand this question.

15. Describe and compare the solution sets of $x_1 + 5x_2 - 3x_3 = 0$ and $x_1 + 5x_2 - 3x_3 = -2$.
From what I think I understood from page 46, theorem 6 if A**x** = **b** has a solution, then the solution set is obtained by translating the solution set of A**x** = **0;** meaning that the solution sets are parallel.

17. Follow the method of Example 3 to describe the solutions of the following system in parametric vector form.

$2x_1 + 2x_2 + 4x_3 = 8$
$-4x_1 - 4x_2 - 8x_3 = -16$
$\quad - 3x_2 - 3x_3 = 12$

$$\begin{bmatrix} 2 & 2 & 4 & 8 \\ -4 & -4 & -8 & -16 \\ 0 & -3 & -3 & 12 \end{bmatrix} \sim \begin{bmatrix} 2 & 2 & 4 & 8 \\ 0 & -3 & -3 & 12 \\ -4 & -4 & -8 & -16 \end{bmatrix} \sim \begin{bmatrix} 2 & 2 & 4 & 8 \\ 0 & -3 & -3 & 12 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \text{x=} \begin{matrix} x_1 \\ x_2 \\ x_3 \end{matrix} = \begin{matrix} 8 \\ -4 \\ 0 \end{matrix}$$

19. Find the parametric equation of the line through a parallel to b.

a = $\begin{bmatrix} \mathbf{-2} \\ \mathbf{0} \end{bmatrix}$**,** **b =** $\begin{bmatrix} \mathbf{-5} \\ \mathbf{3} \end{bmatrix}$ x= a+by y is the boundary

21. Find a parametric equation of the line M through p and q.

p = $\begin{bmatrix} \mathbf{3} \\ \mathbf{-3} \end{bmatrix}$**,** **q =** $\begin{bmatrix} \mathbf{4} \\ \mathbf{1} \end{bmatrix}$ x = p + y(q-p)