

Math 45 Linear Systems Exam

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Instructions. Follow the instructions precisely for each question. Place your solution on your own paper. Write nothing on this examination. Good luck!

1. Consider the following system of equations.

$$\begin{aligned} -x_1 - x_2 - 2x_3 &= -4 \\ -3x_1 + 2x_2 + 3x_3 &= 2 \\ -2x_2 &= -2 \end{aligned} \tag{1}$$

- Set up an augmented matrix for system (1).
 - Place the augmented matrix in part (a) in row echelon form.
 - Use back substitution and the system represented by the row echelon matrix in part (b) to find the unique solution of system (1).
2. Consider the following system of equations.

$$\begin{aligned} -x_1 + 2x_2 + x_3 - 2x_4 &= -2 \\ -x_1 + x_2 - 3x_3 + 3x_4 &= 3 \\ x_1 + x_2 - 3x_3 + x_4 &= 1 \end{aligned} \tag{2}$$

- Set up an augmented matrix for system (2).
 - Place the augmented matrix in part (a) in **reduced** row echelon form.
 - Use the reduced row echelon form of the augmented matrix found in part (b) to find the solution of system (2).
3. Consider the following system of equations.

$$\begin{aligned} x_1 - x_3 &= 1 \\ x_2 - 2x_3 &= 0 \\ 2x_1 - \beta x_3 &= -1 \end{aligned} \tag{3}$$

For what values of β is system (3) consistent?