

Instructions: Show all work. Answer each question as completely as possible. Use exact values (yes, that means fractions!).

1. Write the following system of equations as an augmented matrix.

$$\begin{cases} x_1 + 2x_2 - 5x_3 + 4x_4 = 16 \\ 5x_1 - 7x_2 + x_3 - 2x_4 = 20 \\ 3x_1 + x_2 - 4x_3 + 5x_4 = -17 \\ 2x_1 - 3x_2 - 2x_3 + 6x_4 = 24 \end{cases}$$

$$\left[\begin{array}{cccc|c} 1 & 2 & -5 & 4 & 16 \\ 5 & -7 & 1 & -2 & 20 \\ 3 & 1 & -4 & 5 & -17 \\ 2 & -3 & -2 & 6 & 24 \end{array} \right]$$

2. Row reduce the matrix $\begin{bmatrix} 1 & 4 & -2 \\ 3 & h & -6 \end{bmatrix}$. Determine the values of h that will make the system consistent.

$$\begin{array}{r} -3R_1 + R_2 \rightarrow R_2 \\ \begin{array}{ccc} -3 & -12 & 6 \\ 3 & h & -6 \end{array} \\ \hline \begin{array}{ccc} 0 & h-12 & 0 \end{array} \end{array}$$

$$\left[\begin{array}{cc|c} 1 & 4 & -2 \\ 0 & h-12 & 0 \end{array} \right]$$

h can be any real #.
if $h=12$ the system will be dependent
 $h \neq 12$ independent

3. Suppose that the matrix $A = \begin{bmatrix} 1 & 0 & -5 & 0 & -8 & 3 \\ 0 & 1 & 4 & -1 & 0 & 6 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ is the coefficient matrix of a

homogeneous system that is already partially reduced. Finish reducing the system so that it is in row-reduced echelon form.

$$8R_2 + R_1 \rightarrow R_1 \quad \left[\begin{array}{cccccc|c} 1 & 0 & -5 & 0 & 0 & 3 \\ 0 & 1 & 4 & -1 & 0 & 6 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

entries above and below pivots are all zero.