

## Solutions for Quiz on 1/23

1. Use Gauss-Jordan reduction to find the solutions to the following system of equations:

$$x + y + 5z = 7$$

$$x + 2y + 7z = 9$$

$$2x + 6z + w = 13$$

Using matrix notation :  $\left( \begin{array}{cccc|c} 1 & 1 & 5 & 0 & 7 \\ 1 & 2 & 7 & 0 & 9 \\ 2 & 0 & 6 & 1 & 13 \end{array} \right)$

$-\rho_1 + \rho_2$  and  $-2(\rho_1) + \rho_3$  gives:  $\left( \begin{array}{cccc|c} 1 & 1 & 5 & 0 & 7 \\ 0 & 1 & 2 & 0 & 2 \\ 0 & -2 & -4 & 1 & -1 \end{array} \right)$

$2(\rho_2) + \rho_3$  gives:  $\left( \begin{array}{cccc|c} 1 & 1 & 5 & 0 & 7 \\ 0 & 1 & 2 & 0 & 2 \\ 0 & 0 & 0 & 1 & 3 \end{array} \right)$

$-\rho_2 + \rho_1$  gives:  $\left( \begin{array}{cccc|c} 1 & 0 & 3 & 0 & 5 \\ 0 & 1 & 2 & 0 & 2 \\ 0 & 0 & 0 & 1 & 3 \end{array} \right)$

In vector notation we have:  $\left\{ \begin{pmatrix} 5 \\ 2 \\ 0 \\ 3 \end{pmatrix} + \begin{pmatrix} -3 \\ -2 \\ 1 \\ 0 \end{pmatrix} \cdot z \text{ such that } z \text{ is a real number.} \right\}$

2. Write down two particular solutions.  $\begin{pmatrix} 5 \\ 2 \\ 0 \\ 3 \end{pmatrix}$  and  $\begin{pmatrix} 2 \\ 0 \\ 1 \\ 3 \end{pmatrix}$ . There are many other examples

as well, these are the solutions with  $z = 0$  and  $z = 1$ . Of course one should plug these in to check that they are correct.