

Quiz 1  
Math 314

Name: Key 2/1/08

1. Find all solutions to the system of equations

$$\begin{aligned}x + 2y + z &= 1 \\2x + 4y + 4z &= 5 \\x + y + 2z &= 1\end{aligned}$$

by first finding the reduced echelon form of the augmented matrix.

$$\begin{aligned}\begin{pmatrix} 1 & 2 & 1 & 1 \\ 2 & 4 & 4 & 5 \\ 1 & 1 & 2 & 1 \end{pmatrix} &\rightarrow \begin{pmatrix} 1 & 2 & 1 & 1 \\ 0 & 0 & 2 & 3 \\ 0 & -1 & 1 & 0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 2 & 1 & 1 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & 2 & 3 \end{pmatrix} \\ \rightarrow \begin{pmatrix} 1 & 2 & 1 & 1 \\ 0 & -1 & 1 & 0 \\ 0 & 0 & 1 & 3/2 \end{pmatrix} &\rightarrow \begin{pmatrix} 1 & 2 & 0 & -1/2 \\ 0 & -1 & 0 & 3/2 \\ 0 & 0 & 1 & 3/2 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & 0 & 0 & -7/2 \\ 0 & -1 & 0 & 3/2 \\ 0 & 0 & 1 & 3/2 \end{pmatrix}\end{aligned}$$

so solution is  $x = -7/2, y = 3/2, z = 3/2$

or  $(-7/2, 3/2, 3/2)$

2. Suppose elimination is performed on a system of 12 equations in 18 unknowns.

- (a) How many pivots are *likely* to be produced?

12

- (b) Assuming there are solutions to the system, how many free variables are *likely* to occur in them?

6

- (c) Suppose the system has no solutions. What can you say about the number of pivots?

# of pivots < 12