

QUIZ SOLUTIONS #1, 8/28/07

MATH 54, FALL 2007

1. Using the systematic method demonstrated in lecture and section (i.e. by finding equivalent but simpler systems of equations), find all solutions to

$$\begin{cases} 4x + 3y = 2 \\ x + y = 1 \end{cases}$$

$$\begin{cases} 4x + 3y = 2 \\ x + y = 1 \end{cases} \xrightarrow{-3 \cdot II} \begin{cases} x + 0 = -1 \\ x + y = 1 \end{cases} \xrightarrow{-I} \begin{cases} x + 0 = -1 \\ 0 + y = 2 \end{cases}$$

Thus $x = -1$ and $y = 2$, or the solution set is $\{(-1, 2)\}$ (just one element).

2. Again using the systematic method demonstrated in lecture and section, find all solutions to

$$\begin{cases} 2x + 3y + -4z = 6 \\ 3x + 3y = 6 \\ x + 4z = 0 \end{cases}$$

$$\begin{cases} 2x + 3y + -4z = 6 \\ 3x + 3y = 6 \\ x + 4z = 0 \end{cases} \xrightarrow{\begin{matrix} -2 \cdot III \\ -3 \cdot III \end{matrix}} \begin{cases} 0 + 3y + -12z = 6 \\ 0 + 3y + -12z = 6 \\ x + 4z = 0 \end{cases} \xrightarrow{\times \frac{1}{3}} \begin{cases} 0 + y + -4z = 2 \\ 0 + 3y + -12z = 6 \\ x + 4z = 0 \end{cases} \xrightarrow{-3 \cdot I} \begin{cases} 0 + y + -4z = 2 \\ 0 + 0 + 0 = 0 \\ x + 4z = 0 \end{cases}$$

Thus, letting $z = t$, we have $x = -4t$ and $y = 2 + 4t$ (and these are precisely the solutions). Thus the solution set is $\{(-4t, 2 + 4t, t) : t \text{ is any real number}\}$.