Math 254 Mon 18 June 2018

1.1 Intro to systems of linear equations

ex:
$$\begin{cases} x + 2y + 5z = 4 & (1) \\ 3x + 4y + z = -4 & (2) \end{cases}$$

$$\begin{aligned}
-3\cdot(1):&\quad -3x - 6y - 15z = -12 \\
(2):&\quad \underline{3x + 4y + z} = \underline{-4} \\
&\quad -2y - 14z = -16 \\
(3):&\quad y + 7z = 8
\end{aligned}$$

$$\begin{aligned}
(1):&\quad \begin{cases} x + 2y + 5z = 4 \\ y + 7z = 8 \end{cases} \\
(3):&
\end{aligned}$$

$$\begin{aligned}
-2\cdot(3):&\quad -2y - 14z = -16 \\
(1):&\quad \underline{x + 2y + 5z} = \underline{4} \\
(4)&\quad x \qquad -9z = -12
\end{aligned}$$

$$\begin{aligned}
(4)&\quad \begin{cases} x \qquad -9z = -12 \\ y + 7z = 8 \end{cases} \\
(3)&
\end{aligned}$$

ex (cont'd) <u>Note</u>: z is a "free variable".

Let $z = t$, where t is an arbitrary real number (a "parameter").

Then
$$\begin{cases} x = -12 + 9t \\ y = 8 - 7t \\ z = t \end{cases}$$

<u>Some</u> solutions: If $t = 0$

$(x, y, z) = (-12, 8, 0)$ is a solution

If $t = 1$:
$(x, y, z) = (-3, 1, 1)$ is another solution.