5.2 Linear Sys. with Multi Variables

ex. 1

$x - 2y - z = 1$

$y + 2z = 5$

$z = 3$

Sub "z" into eq. above

$y + 2(3) = 5$

$y + 6 = 5$

$y = -1$

sub. z and y into ①

$x - 2(-1) - (3) = 1$

$x + 2 - 3 = 1$

$x - 1 = 1$

$x = 2$

x y z

$(2, -1, 3)$

ex

① $x - 2y + 3z = 1$

② $x + 2y - z = 13$

③ $3x + 2y - 5z = 3$

① + ② → ④

$$\begin{array}{r} x - 2y + 3z = 1 \\ x + 2y - z = 13 \\ \hline ④\ \ 2x \quad + 2z = 14 \end{array}$$

① + ③ → ⑤

$$\begin{array}{r} x - 2y + 3z = 1 \\ 3x + 2y - 5z = 3 \\ \hline ⑤\ \ 4x \quad - 2z = 4 \end{array}$$

④ + ⑤

$$\begin{array}{r} 2x + 2z = 14 \\ 4x - 2z = 4 \\ \hline 6x = 18 \end{array}$$

$\boxed{x = 3}$ sub into ④

$2(3) + 2z = 14$

$6 + 2z = 14$

$2z = 8$

$\boxed{z = 4}$

sub into ②

$3 + 2y - 4 = 13$

$2y - 1 = 13$

$2y = 14$

$\boxed{y = 7}$

sub in x and z

$(3, 7, 4)$

5.2- Sys. of linear eq. in Several Variables.

① $x + y + z = 4$

② $x + 3y + 3z = 10$

③ $2x + y - z = 3$

elim. "x"

① − ② → $x + y + z = 4$

$-x - 3y - 3z = -10$

④ $-2y - 2z = -6$

(2)⑤ $2y + 3z = 10$

$4z = 4$

$z = 1$

2① − ③ → $2x + 2y + 2z = 8$

$-2x - y + z = -3$

⑤ $y + 3z = 5$

Back sub. into ④ or ⑤

$y + 3(1) = 5$

$y + 3 = 5$

$y = 2$

sub into ①, ②, or ③

$x + 2 + 1 = 4$

$x = 1$

$(1, 2, 1)$

$x\ y\ z$

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ex. 2

① $x - 4z = 1$

② $2x - y - 6z = 4$

③ $2x + 3y - 2z = 8$

3② + ③ → ④

$6x - 3y - 18z = 12$

$2x + 3y - 2z = 8$

④ $8x - 20z = 20$

④ − 5①:

$8x - 20z = 20$

$-5x + 20z = -5$

$3x = 15$

$x = 5$

① $x - 4z = 1$ using ①

$5 - 4z = 1$

$-4z = -4$

$z = 1$

now, using ②

$2(5) - y - 6(1) = 4$

$10 - y - 6 = 4$

$-y + 4 = 4$

$-y = 0$

$y = 0$

(5, 0, 1)