

Next test: [Oct 3]

$(-8 \quad -13 \quad 8) \quad (1 \quad 0 \quad 0)$
 $(-4 \quad -13 \quad 5) \quad (0 \quad 1 \quad 0)$
 $(-13 \quad 0 \quad 8) \quad (0 \quad 0 \quad 1)$

Step 2: $x = 3$

	C_1	C_2	C_3	C_4	C_5	C_6	C_7
x	10	0	10	0	-10	0	10
y	13	-13	-1	0	1	13	5

$x = 3$ $x = 3$

$0 = x = 0 = x + 13$ $0 = x - 13$

$0 = 50x(x-5) = 50x(x+13)(x-3)$

$1 = 50x^2 - 90x = 50x(x-3)$

	C_1	C_2	C_3	C_4	C_5	C_6	C_7
x	13	0	-5	0	25	0	13
y	1	-1	1	0	1	1	5

$$x + y = 100$$

$$x - 2y = 10$$

Check:
 $70 + 30 = 100 \checkmark$
 $70 - 2(30) = 10 \checkmark$

$$\left[\begin{array}{cc|c} 1 & 1 & 100 \\ 1 & -2 & 10 \end{array} \right] \begin{array}{l} R_1 \\ R_2 \end{array} \quad \text{augmented} \\ \text{matrices}$$

Goal: $\left[\begin{array}{cc|c} 1 & 0 & - \\ 0 & 1 & - \end{array} \right]$

$$\left[\begin{array}{cc|c} 1 & 1 & 100 \\ 0 & -3 & -90 \end{array} \right] \begin{array}{l} R_1 \\ R_2 - R_1 \end{array}$$

$$\left[\begin{array}{cc|c} 1 & 1 & 100 \\ 0 & 1 & 30 \end{array} \right] \begin{array}{l} R_1 \\ -R_2/3 \end{array}$$

$$\left[\begin{array}{cc|c} 1 & 0 & 70 \\ 0 & 1 & 30 \end{array} \right] \begin{array}{l} R_1 - R_2 \\ R_2 \end{array} \quad \begin{array}{l} x = 70 \\ y = 30 \end{array}$$

$$\begin{bmatrix} 2 & 3 & 10 \\ 4 & -1 & 6 \end{bmatrix} \begin{matrix} R_1 \\ R_2 \end{matrix}$$

$$\begin{bmatrix} 1 & 3/2 & 5 \\ 4 & -1 & 6 \end{bmatrix} \begin{matrix} R_1/2 \\ R_2 \end{matrix}$$

$$\begin{bmatrix} 1 & 3/2 & 5 \\ 0 & -7 & -14 \end{bmatrix} \begin{matrix} R_1 \\ R_2 - 4R_1 \end{matrix}$$

$$\begin{bmatrix} 1 & 3/2 & 5 \\ 0 & 1 & 2 \end{bmatrix} \begin{matrix} R_1 \\ -R_2/7 \end{matrix}$$

$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 2 \end{bmatrix} \begin{matrix} R_1 - \frac{3}{2}R_2 \\ \end{matrix}$$

$x \quad x$

$$x = 2 \text{ \& } x = 2$$

Checks:

$$2(2) + 3(2) = 10? \text{ Yes}$$

$$4(2) - 1(2) = 6? \text{ Yes}$$

$$\begin{aligned}x + 2y + 3z &= 4 \\5x + 6y + 7z &= 8 \\x - y - z &= 9\end{aligned}$$

$$\left[\begin{array}{cccc|l} 1 & 2 & 3 & 4 & R_1 \\ 5 & 6 & 7 & 8 & R_2 \\ 1 & -1 & -1 & 9 & R_3 \end{array} \right]$$

Goal: $\left[\begin{array}{cccc|l} \text{A} & & & & \\ & \text{B} & & & \\ & & \text{C} & & \\ & & & \text{D} & \\ & & & & \text{E} \\ & & & & \text{F} \\ & & & & \text{G} \\ & & & & \text{H} \\ & & & & \text{I} \\ & & & & \text{J} \end{array} \right] \begin{array}{l} - \\ - \\ - \end{array} \begin{array}{l} x = _ \\ y = _ \\ z = _ \end{array}$

From left to right, get a 1 on the diagonal & get 0s on the rest of that column.

$$\left[\begin{array}{cccc|l} 1 & 2 & 3 & 4 & R_1 \\ 0 & -4 & -8 & -12 & R_2 - 5R_1 \\ 1 & -1 & -1 & 9 & R_3 \end{array} \right]$$

$$\left[\begin{array}{cccc|l} 1 & 2 & 3 & 4 & R_1 \\ 0 & -4 & -8 & -12 & R_2 \\ 0 & -3 & -4 & 5 & R_3 - R_1 \end{array} \right]$$

$$\left[\begin{array}{cccc|l} 1 & 2 & 3 & 4 & R_1 \\ 0 & 1 & 2 & 3 & -R_2/4 \\ 0 & -3 & -4 & 5 & R_3 \end{array} \right]$$

$$\begin{bmatrix} 1 & 0 & -1 & -2 \\ 0 & 1 & 2 & 3 \\ 0 & -3 & 4 & 5 \end{bmatrix} \begin{array}{l} R_1 - 2R_2 \\ R_2 \\ R_3 \end{array}$$

$$\begin{bmatrix} 1 & 0 & -1 & -2 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 2 & 14 \end{bmatrix} \begin{array}{l} R_1 \\ R_2 \\ R_3 + 3R_2 \end{array}$$

$$\begin{bmatrix} 1 & 0 & -1 & -2 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 7 \end{bmatrix} \begin{array}{l} R_1 \\ R_2 \\ R_3 / 2 \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 7 \end{bmatrix} \begin{array}{l} R_1 + R_3 \\ R_2 \\ R_3 \end{array}$$

$$\begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & -11 \\ 0 & 0 & 1 & 7 \end{bmatrix} \begin{array}{l} R_1 - 2R_3 \\ R_2 \\ R_3 \end{array}$$

$$x = 5, \quad y = -11, \quad z = 7$$

HW: Solve

$$\begin{cases} 3s + 2t - u = 10 \\ s + t + u = 5 \\ -7s - 6t + 4u = -3 \end{cases}$$

Use Gauss-Jordan
Elimination.