S4.1 #28

$\frac{2}{3}x + \frac{1}{4}y = -\frac{3}{2}$ LCD = 12

$\frac{1}{2}x - \frac{1}{4}y = -2$ LCD = 4

$12\left(\frac{2}{3}x\right) + 12\left(\frac{1}{4}y\right) = 12\left(-\frac{3}{2}\right)$

$8x + 3y = -18$

$4(\frac{1}{2}x) - 4(\frac{1}{4}y) = 4(-2)$

$2x - y = -8$ Ivan

$\frac{12}{1} \cdot \frac{2x}{3} = \frac{8x}{1} = 8x$

This work gives

$8x + 3y = -18$

$-4(2x - y = -8)$

$8x + 3y = -18$

$-8x + 4y = 32$

$7y = 14$

$y = \frac{14}{7} = 2 = y$

$8x + 3y = -18$

$8x + 3(2) = -18$

$8x + 6 = -18$

$-6 = -6$

$8x = -24$

$\therefore x = -\frac{24}{8} = \boxed{-3 = x}$

$\boxed{(x,y) \in \{(-3,2)\}}$

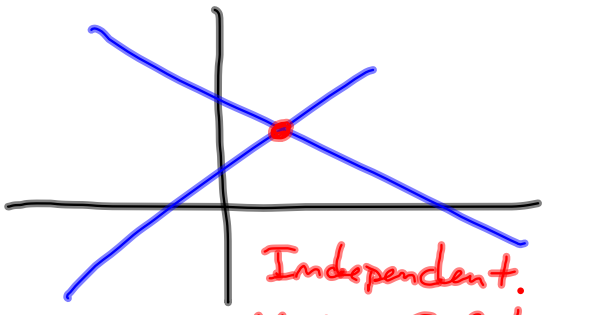
Check: $2x - y = -8$

$2(-3) - 2 = -8$ ✓

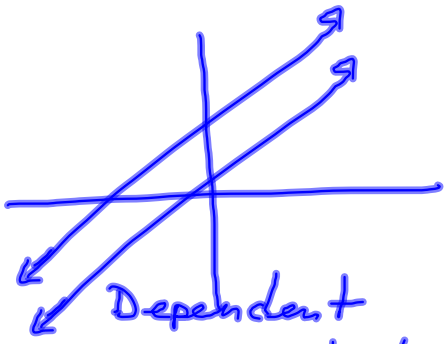
$-6 - 2 = -8$

Good, assuming we cleared fractions OK.

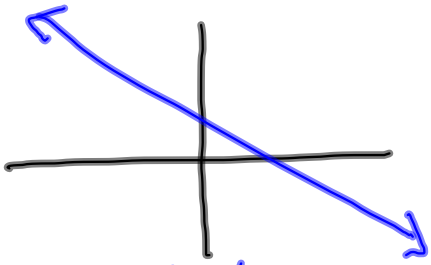
Pictures for 2x2 systems



Independent.
Unique Solution
Consistent



Dependent
Inconsistent
System.
Parallel.



Dependent
Consistent
Same line.

§ 4.2 Systems in 3 variables.

$Ax+By=C$ is a line in 2-space (↳ in the plane.)

$Ax+By+Cz=D$ is a plane in 3-space

Pg 216 shows what a system of 3 equations in 3 variables might look like.

① Eliminate x in 2 equations using the "other equation." Write the new system

② Solve the resulting 2x2 system using 4.1 methods. (Write the new system after finding one variable.)

③ Use the solution from previous step to find x in the "other equation."

4.2 #5

coefficient "1" is nice.

$x - y + z = -4$ E1

$3x + 2y - z = 5$ E2

$-2x + 3y - z = 15$ E3

Add -3E1 to E2

$-3(x - y + z = -4) \longrightarrow -3x + 3y - 3z = 12$ -3E1

$+ \quad 3x + 2y - z = 5$ E2

$5y - 4z = 17$

Add 2E1 to E3

$2(x - y + z = -4) \longrightarrow 2x - 2y + 2z = -8$ 2E1

$-2x + 3y - z = 15$ E3

$y + z = 7$

New System

$x - y + z = -4$

$5y - 4z = 17$

$y + z = 7$

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New System

$x - y + z = -4$

$5y - 4z = 17$

$y + z = 7$ → Solve this, now!

$-5(y + z = 7)$

$5y - 4z = 17$

$-5y - 5z = -35$

$5y - 4z = 17$

$-9z = -18$

$z = \frac{-18}{-9} = 2 = z$

The Final System is triangular!

$x - y + z = -4$

$5y - 4z = 17$

$z = 2$

$5y - 4z = 17$

$5y - 4(2) = 17$

$5y - 8 = 17$

$5y = 25$

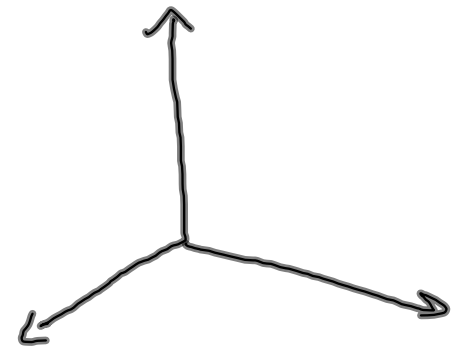
$y = 5$

$x - y + z = -4$

$x - 5 + 2 = -4$

$x - 3 = -4$

$x = -1$



$y = 5, z = 2$

$x = -1, y = 5, z = 2$

$(x, y, z) \in \{(-1, 5, 2)\}$

Just for illustration.

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 3 & 2 & -1 & 5 \\ -2 & 3 & -1 & 15 \end{array}\right] \sim \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 5 & -4 & 17 \\ 0 & 1 & 1 & 7 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & 1 & 7 \\ 0 & 5 & -4 & 17 \end{array}\right]$$

$$\begin{aligned} x - y + z &= -4 \\ 5y - 4z &= 17 \\ x + y &= 7 \end{aligned}$$

$$\sim \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & 1 & 7 \\ 0 & 0 & -9 & -18 \end{array}\right] \sim \left[\begin{array}{ccc|c} 1 & -1 & 1 & -4 \\ 0 & 1 & 1 & 7 \\ 0 & 0 & 1 & 2 \end{array}\right]$$

4.1 II Wed.

§4.2 #s 5, 10, 13, 17, 25, 32 Friday.

§4.3 #s 1, 6, 8, 23, (37, 38) → Setup only

§4.5 #s 1, 4, 7, 12, 15, 20

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