Math 3 HW – Solving 3 by 3 systems

① $\begin{cases} x - y + 2z = -1 \\ 3x - 2y = 15 \\ -2x = -10 \end{cases}$

$-2x = -10 \rightarrow x = 5$

$3x - 2y = 15 \rightarrow 3(5) - 2y = 15$

$15 - 2y = 15$

$-2y = 0$

$y = 0$

$5 - 0 + 2z = -1$

$5 + 2z = -1$

$2z = -6$

$z = -3$

$(5, 0, -3)$

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② ① $4x + 9z = 8$

② $-2x - 4y - 5z = -16$

③ $6x + 4y - 4z = 24$

if you choose to eliminate y, equation 1 is already a ★ equation!

★ ① $4x + 9z = 8$

② $-2x - 4y - 5z = -16$

③ $6x + 4y - 4z = 24$

★ $4x - 9z = 8$

★ $\begin{cases} 4x + 9z = 8 \\ 4x - 9z = 8 \end{cases}$

$8x = 16$

$x = 2$

solve for z: $4(2) + 9z = 8$

$8 + 9z = 8$

$9z = 0$

$z = 0$

Solve for y using eqn #②

$-2x - 4y - 5z = -16$

$-2(2) - 4y - 5(0) = -16$

$-4 - 4y = -16$

$-4y = -12$

$y = 3$

$(2, 3, 0)$

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③ ① $-3x + 2y + 4z = 22$

② $-3x - 2y - 4z = 14$

③ $-3x - 3y - 4z = 10$

eliminate z

① $-3x + 2y + 4z = 22$

② $-3x - 2y - 4z = 14$

★ $-6x = 36$

① $-3x + 2y + 4z = 22$

③ $-3x - 3y - 4z = 10$

★ $-6x - y = 32$

★ $\begin{cases} -6x = 36 \rightarrow x = -6 \\ -6x - y = 32 \end{cases}$

$-6(-6) - y = 32$

$36 - y = 32$

$-y = -4 \rightarrow y = 4$

Solve for z using equation ①

$-3(-6) + 2(4) + 4z = 22$

$18 + 8 + 4z = 22$

$26 + 4z = 22$

$4z = -4$

$z = -1$

$(-6, 4, -1)$

(4) ① $-3x-y+6z=16$
② $-x+5y-6z=8$
③ $-3x-y+3z=7$

eliminate x

① $-3x-y+6z=16$
③ $-3x-y+3z=7$ (mult. -1)

$+\{\ 3x+y-3z=-7$

$\bigstar\ 3z=9$

② $-x+5y-6z=8$ (mult. -3)
③ $-3x-y+3z=7$

$+\{\ -8x-y+3z=7$

$\bigstar\ -16y+21z=-17$

$\begin{cases} 3z=9 \\ -16y+21z=-17 \end{cases}$ → $z=3$

$-16y+21(3)=-17$
$-16y+63=-17$
$-16y=-80$
$y=5$

Solve for x using equation 2
$-x+5(5)-6(3)=8$
$-x+25-18=8$
$-x+7=8$
$-x=1$
$x=-1$

$(-1, 5, 3)$

(5) ① $-3x-y+3z=-4$
② $3x+5y-6z=-25$
③ $4x+3y+4z=21$

eliminate y

① $-3x-y+3z=-4$ (mult. 5)
② $3x+5y-6z=-25$

$+\{\ -15x-5y+15z=-20$

$\bigstar\ -12x+9z=-45$

① $-3x-y+3z=-4$ (mult. 3)
③ $4x+3y+4z=21$

$+\{\ -9x-3y+9z=-12$

$\bigstar\ -5x+13z=9$

$(6, -5, 3)$

$\begin{cases} -12x+9z=-45 \text{ (mult. 5)} \\ -5x+13z=9 \text{ (mult. -12)} \end{cases}$ → $-5x+13(3)=9$

$+\{\ -60x+45z=-225$

$-111z=-333$

$z=3$

$-5x+39=9$
$-5x=-30$
$x=6$

Solve for y using equation #1
$-3(6)-y+3(3)=-4$
$-18-y+9=-4$
$-9-y=-4$
$y=5$

$y=-5$