

Warm up

Solve the following system of equations using algebra and tell what type of system it is.

$$6x + 6y - 12z = 12$$

$$3x - y + z = 1$$

$$2x + 2y - 4z = 4$$

Using 1 + 3

$$6x + 6y - 12z = 12$$

$$(-) \underline{6x + 6y - 12z = 12}$$

$$0 = 0$$

Infinite.
Solutions

Consistent system with a dependent solution

Questions from Homework

$$\begin{aligned} \textcircled{2} \quad & 4x + 3y - z = -7 \\ & 3x - 2y + 3z = -10 \\ & x + y - z = -2 \end{aligned}$$

$$\left[\begin{array}{ccc|c} 4 & 3 & -1 & -7 \\ \underline{3} & -2 & 3 & -10 \\ \underline{1} & 1 & -1 & -2 \end{array} \right] \begin{array}{l} R_2 - 3R_3 \\ 4R_3 - R_1 \end{array} \left[\begin{array}{ccc|c} 4 & 3 & -1 & -7 \\ 0 & -5 & 6 & -4 \\ 0 & \underline{1} & -3 & -1 \end{array} \right] \begin{array}{l} 5R_3 + R_2 \end{array} \left[\begin{array}{ccc|c} 4 & 3 & -1 & -7 \\ 0 & -5 & 6 & -4 \\ 0 & 0 & -9 & -9 \end{array} \right]$$

$$\begin{aligned} -9z &= -9 \\ \boxed{z} &= 1 \end{aligned}$$

$$\begin{aligned} -5y + 6z &= -4 \\ -5y + 6(1) &= -4 \\ -5y &= -10 \\ \boxed{y} &= 2 \end{aligned}$$

$$\begin{aligned} 4x + 3y - z &= -7 \\ 4x + 3(2) - (1) &= -7 \\ 4x + 6 - 1 &= -7 \\ 4x &= -12 \\ \boxed{x} &= -3 \end{aligned}$$

$$\underline{\underline{(-3, 2, 1)}}$$

Solve the following system of equations using an augmented matrix reduced to its row echelon form...

$$2x + 2y + 4z = 0$$

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

$$2x + 5y + 8z = 6$$

1. Express system in the form of an augmented matrix
2. Eliminate "x" in equation 2 and 3.
3. Eliminate "y" in equation 3 (must add/subtract 2 and 3)
4. Create triangle of zeroes and solve.

$$\left[\begin{array}{ccc|c} 2 & 2 & 4 & 0 \\ 1 & -2 & 1 & 3 \\ 2 & 5 & 8 & 6 \end{array} \right] \xrightarrow{\substack{2R_2 - R_1 \\ R_3 - R_1}} \left[\begin{array}{ccc|c} 2 & 2 & 4 & 0 \\ 0 & -9 & -6 & 0 \\ 0 & 3 & 4 & 6 \end{array} \right] \xrightarrow{3R_3 + R_2} \left[\begin{array}{ccc|c} 2 & 2 & 4 & 0 \\ 0 & -9 & -6 & 0 \\ 0 & 0 & 6 & 18 \end{array} \right]$$

$$6z = 18$$

$$\boxed{z = 3}$$

$$-9y - 6z = 0$$

$$-9y - 6(3) = 0$$

$$-9y - 18 = 0$$

$$-9y = 18$$

$$\boxed{y = -2}$$

$$2x + 2y + 4z = 0$$

$$2x + 2(-2) + 4(3) = 0$$

$$2x - 4 + 12 = 0$$

$$2x + 8 = 0$$

$$2x = -8$$

$$\boxed{x = -4}$$

$$\underline{\underline{(-4, -2, 3)}}$$

Check with TI-84

$$2x + 2y + 4z = 0$$

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

$$2x + 5y + 8z = 6$$

$$\left[\begin{array}{ccc|c} 2 & 2 & 4 & 0 \\ 1 & -2 & 1 & 3 \\ 2 & 5 & 8 & 6 \end{array} \right]$$

```
rref([A])  
[[1 0 0 -4]  
 [0 1 0 -2]  
 [0 0 1 3]]
```

$(-4, -2, 3)$

Homework

Worksheet #

Solve the system of equations using matrix elimination!