

Matrix Representations of Systems of Equations

1. You have a business that sells tables and chairs. You have brown tables and white tables, and corresponding chairs. Your current inventory is 4 brown tables, 6 white tables, 20 brown chairs, and 24 white chairs. Which matrix would best represent this information?

(a)

$$\begin{bmatrix} 4 & 6 \\ 20 & 24 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 4 & 6 \\ 24 & 20 \end{bmatrix}$$

(c)

$$\begin{bmatrix} 6 & 4 \\ 20 & 24 \end{bmatrix}$$

(d) They all represent the information equally well.

2. Which augmented matrix represents the following system of equations?

$$\begin{aligned} x + 2y &= 3 \\ 4y + 5x &= 6 \end{aligned}$$

(a)

$$\begin{bmatrix} 0 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

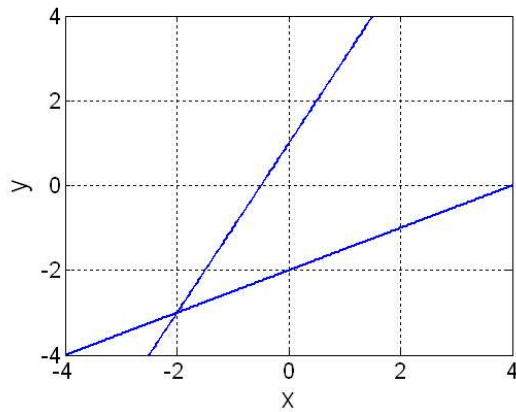
(c)

$$\begin{bmatrix} 1 & 2 & 3 \\ 5 & 4 & 6 \end{bmatrix}$$

(d)

$$\begin{bmatrix} 0 & 2 & 3 \\ 5 & 4 & 6 \end{bmatrix}$$

3. The rows of which augmented matrix represent equations plotted below?



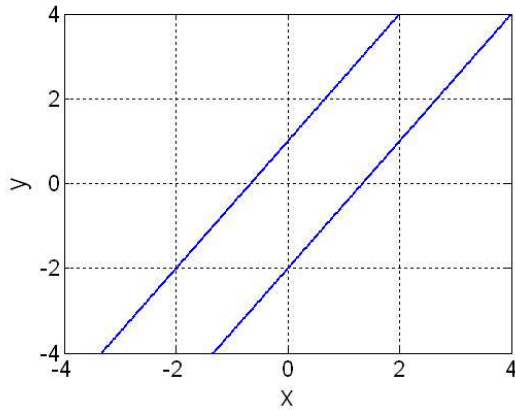
- (a) $\begin{bmatrix} 1 & 0 & 3 \\ -3 & -3 & 4 \end{bmatrix}$
- (b) $\begin{bmatrix} 2 & 2 & -3 \\ 0 & 1 & 4 \end{bmatrix}$
- (c) $\begin{bmatrix} 1 & 2 & -4 \\ 3 & -2 & -2 \end{bmatrix}$
- (d) $\begin{bmatrix} -2 & 1 & 1 \\ 1 & -2 & 4 \end{bmatrix}$

4. Which matrix represents the following system of equations?

$$\begin{aligned}x &= 6 \\ y &= 3\end{aligned}$$

- (a) $\begin{bmatrix} 1 & 6 \\ 1 & 3 \end{bmatrix}$
- (b) $[1 \ 1 \ 9]$
- (c) $\begin{bmatrix} 1 & 0 & 6 \\ 0 & 1 & 3 \end{bmatrix}$

5. The rows of which augmented matrix represent the equations plotted below?



(a)

$$\begin{bmatrix} 3 & -2 & 4 \\ 6 & -4 & 8 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 3 & -2 & -2 \\ 3 & -2 & 4 \end{bmatrix}$$

(c)

$$\begin{bmatrix} 3 & 2 & -2 \\ 3 & -2 & 2 \end{bmatrix}$$

(d)

$$\begin{bmatrix} 6 & -4 & 8 \\ 3 & 2 & -2 \end{bmatrix}$$

6. What is the solution to the system of equations represented with this augmented matrix?

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 4 \end{bmatrix}$$

(a) $x = 2, y = 3, z = 4$

(b) $x = -1, y = 1, z = 1$

(c) There are an infinite number of solutions.

(d) There is no solution.

(e) We can't tell without having the system of equations.

7. What is the solution to the system of equations represented with this augmented matrix?

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 4 \end{bmatrix}$$

- (a) $x = 2, y = 3, z = 4$
 - (b) $x = -1, y = 1, z = 1$
 - (c) There are an infinite number of solutions.
 - (d) There is no solution.
 - (e) We can't tell without having the system of equations.
8. Suppose we want to graph the equations represented by the rows of the augmented matrix below. What will they look like?

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 4 \end{bmatrix}$$

- (a) These equations represent two lines that intersect at $x = 2$ and $y = 3$.
 - (b) These equations represent three parallel planes.
 - (c) These equations represent three planes that are not parallel, but which do not share a common point of intersection.
 - (d) These equations cannot be represented geometrically.
9. What is the solution to the system of equations represented with this augmented matrix?

$$\begin{bmatrix} 1 & 0 & 3 & 2 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

- (a) $x = 2, y = 3, z = 4$
- (b) $x = -1, y = 1, z = 1$
- (c) There are an infinite number of solutions.
- (d) There is no solution.
- (e) We can't tell without having the system of equations.

10. Suppose we want to graph the equations represented by the rows of the augmented matrix below. What will they look like?

$$\begin{bmatrix} 1 & 0 & 3 & 2 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

- (a) These equations represent two equations for the same plane.
- (b) These equations represent three equations for the same plane.
- (c) These equations represent two planes that have a line of points in common.
- (d) The intersection of these linear equations is represented by a plane in \mathfrak{R}^3 .
- (e) These equations cannot be represented geometrically.