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HW 0.0 9/13/20

Section: 003

PARTICIPATION ACTIVITY | 1.1.2: Determining whether an ordered pair is a solution to a system of linear equations.

1 2 3 2x speed

$$\begin{aligned} x_1 + x_2 &= 2 \\ x_1 - x_2 &= 4 \end{aligned}$$

$(3, -1)$

$$\begin{aligned} x_1 + x_2 &= 2 & x_1 - x_2 &= 4 \\ 3 + (-1) &= 2 & 3 - (-1) &= 4 \\ 2 &= 2 \checkmark & 4 &= 4 \checkmark \end{aligned}$$

$(3, -1)$ is a solution

$(2, 0)$

$$\begin{aligned} x_1 + x_2 &= 2 & x_1 - x_2 &= 4 \\ 2 + 0 &= 2 & 2 - 0 &= 4 \\ 2 &= 2 \checkmark & 2 &= 4 \times \end{aligned}$$

$(2, 0)$ is not a solution

$(2, 0)$ is not a solution to the system because substituting 2 for x_1 and 0 for x_2 in the second equation fails to yield a true statement.

Captions

1. To determine whether $(3, -1)$ is a solution, 3 is substituted for x_1 and -1 is substituted for x_2.
2. Since the resulting equations are true, $(3, -1)$ is a solution to the system.
3. $(2, 0)$ is not a solution to the system because substituting 2 for x_1 and 0 for x_2 in the second equation fails to yield a true statement.

Feedback?

PARTICIPATION ACTIVITY | 1.1.3: Determining if an n-tuple is a solution to a system.

Determine if the given n-tuple is a solution to the system.

1) $(1, 3)$

$$\begin{aligned} 2x_1 + x_2 &= 5 \\ x_1 - x_2 &= -5 \end{aligned}$$

○ Solution

◉ Not a solution

Correct

$(1, 3)$ should satisfy both equations, but only the first equation is satisfied. Thus, $(1, 3)$ is not a solution.

$$\begin{aligned} 2(1) + (3) &= 5 \\ 2 + 3 &= 5 \\ 5 &= 5 \\ (1) - (3) &= -5 \\ -2 &\neq -5 \end{aligned}$$

2) $(7, 1)$

$$\begin{aligned} x_1 - 2x_2 &= 5 \\ -2x_1 + 4x_2 &= -10 \end{aligned}$$

◉ Solution

○ Not a solution

Correct

$(7, 1)$ satisfies both equations and is thus a solution to the linear system.

$$\begin{aligned} (7) - 2(1) &= 5 \\ 5 &= 5 \\ -2(7) + 4(1) &= -10 \\ -10 &= -10 \end{aligned}$$

3) $(3, -1)$

$$\begin{aligned} x_1 - 2x_2 &= 5 \\ -2x_1 + 4x_2 &= -10 \end{aligned}$$

◉ Solution

○ Not a solution

Correct

$(3, -1)$ satisfies both equations and is thus a solution to the linear system.

$$\begin{aligned} (3) - 2(-1) &= 5 \\ 5 &= 5 \\ -2(3) + 4(-1) &= -10 \\ -10 &= -10 \end{aligned}$$

Note that the system $\begin{aligned} x_1 - 2x_2 &= 5 \\ -2x_1 + 4x_2 &= -10 \end{aligned}$ has more than one solution.

4) $(5, 1, -1)$

Correct

Note that the system $-2x_1 + 4x_2 = -10$ has more than one solution.

4) $(5, 1, -1)$

$$\begin{aligned} x_1 + x_2 - x_3 &= 7 \\ 4x_1 + x_2 - 3x_3 &= -2 \\ x_1 - 3x_2 + x_3 &= 1 \end{aligned}$$

- ○ Solution
- ◉ Not a solution

Correct

The solution to a system of three equations should satisfy all three equations. However, $(5, 1, -1)$ only satisfies the first and third equations. Thus, $(5, 1, -1)$ is not a solution.

5) $(5, 1, -1)$

$$\begin{aligned} x_1 + x_2 - x_3 &= 7 \\ x_1 - x_2 + x_3 &= 3 \\ x_1 - 3x_2 + x_3 &= 1 \end{aligned}$$

- ◉ Solution
- ○ Not a solution

Correct

$(5, 1, -1)$ satisfies all three equations and is thus a solution to the linear system.

6) $(1, -4, 8, -2)$

$$\begin{aligned} x_1 + x_2 + x_3 + x_4 &= 3 \\ 2x_2 + x_3 &= 0 \\ x_3 + 4x_4 &= 0 \\ x_4 &= -2 \end{aligned}$$

- ◉ Solution
- ○ Not a solution

Correct

A system of linear equations may contain more than three variables and equations. The solution is a 4-tuple, which satisfies each of the four equations. Thus, $(1, -4, 8, -2)$ is a solution to the system.

Feedback?

PARTICIPATION ACTIVITY | 1.2.6: Finding a transpose.

1) The transpose of a 2×4 matrix is a 4×2 matrix.

- ◉ True
- ○ False

Correct

Since the transpose is found by switching the rows and columns of a matrix, the transpose of a 2×4 matrix is a 4×2 matrix.

2) The transpose of $A = \begin{bmatrix} 1 & 0 & 3 \\ 0 & -2 & 6 \\ 5 & 4 & 2 \end{bmatrix}$ is $A^T = \begin{bmatrix} 5 & 4 & 2 \\ 0 & -2 & 6 \\ 1 & 0 & 3 \end{bmatrix}$.

- ○ True
- ◉ False

Correct

The transpose is found by switching the rows and columns of a matrix.

$$A^T = \begin{bmatrix} 1 & 0 & 5 \\ 0 & -2 & 4 \\ 3 & 6 & 2 \end{bmatrix}$$

3) The transpose of $A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$ is

$A^T = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$.

- ○ True
- ◉ False

Correct

The matrix A is not the identity matrix, so $I_n^T = I_n$ does not apply.

$$A^T = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

Feedback?