Pearson SuccessNet - Google Chrome

www.pearsonsuccessnet.com/snpapp/learn/navigateIDP.do?method=vlo&internalId=131114100000030&isHtml5Sco=false&fromTab=DONETAB#

2-10: Solving Systems Using Matrices

9/4/14

Launch   Instruction   Practice   Self Assessment

Problem 1   2   3   4   5

Problem 1   **Identifying a Matrix Element**

GRIDDED RESPONSE What is element a_{23} in matrix A?

$$A = \begin{bmatrix} 4 & -9 & 17 & 1 \\ 0 & 5 & 8 & 6 \\ -3 & -2 & 10 & 0 \end{bmatrix}$$

A_{23} is in row 2 and column 3.

a_{23} is 8.

Think

Does the order of the subscript in a_{23} matter?

Yes. a_{23} and a_{32} are different elements.

Matrix: array of variables or numbers in horizontal rows and vertical columns, usually enclosed with brackets [ ].

2 of 4

Pearson SuccessNet - Google Chrome

www.pearsonsuccessnet.com/snpapp/learn/navigateIDP.do?method=vlo&internalId=131114100000030&isHtml5Sco=false&fromTab=DONETAB#

2-10: Solving Systems Using Matrices

Launch Instruction Practice Self Assessment

Problem 1 2 3 4 5

Problem 2 **Representing Systems With Matrices**

B How can you represent the system of equations with a matrix?

$$\begin{cases} x - 3y + z = 6 \\ x + 3z = 12 \\ y = -5x + 1 \end{cases} \Rightarrow 5x + y = 1$$

Step 1 Write each equation in the same variable order. Line up the variables. Leave space where a coefficient is 0.

Start with the first equation.

Write the second equation.

Write the third equation. Gather the variables on the left side.

$$\begin{cases} x \quad - \quad 3y \quad + \quad z \quad = \quad 6 \\ x \quad +0y \quad + \quad 3z \quad = \quad 12 \\ 5x \quad + \quad y \quad +0z \quad = \quad 1 \end{cases}$$

Step 2 Write the matrix using the coefficients and constants. Notice where the coefficients are 1's and 0's.

The matrix $\begin{bmatrix} 1 & -3 & 1 & | & 6 \\ 1 & 0 & 3 & | & 12 \\ 5 & 1 & 0 & | & 1 \end{bmatrix}$ represents the system.

Use RREF (Reduced-row echelon form) to find all missing values.

5) $x - 6z = -4$ $1x + 0y - 6z = -4$ 6) $5r - 5s + t = -22$ $5r - 5s + t = -22$
$-6x - 5y + 3z = 24$ → $-6x - 5y + 3z = 24$ $r + 4s - 3t = 6$ → $r + 4s - 3t = 6$
$2x - 5y - 6z = -8$ $2x - 5y - 6z = -8$ $-3r - 3t = -6$ $-3r + 0s - 3t = -6$

Step 1: Set up matrix

$A = \begin{bmatrix} 1 & 0 & -6 & | & -4 \\ -6 & -5 & 3 & | & 24 \\ 2 & -5 & -6 & | & -8 \end{bmatrix}$ → $rref(A) = \begin{bmatrix} 1 & 0 & 0 & | & -4 \\ 0 & 1 & 0 & | & 0 \\ 0 & 0 & 1 & | & 0 \end{bmatrix}$ $B = \begin{bmatrix} 5 & -5 & 1 & | & -22 \\ 1 & 4 & -3 & | & 6 \\ -3 & 0 & -3 & | & -6 \end{bmatrix}$ → $rref(B) = \begin{bmatrix} 1 & 0 & 0 & | & -1 \\ 0 & 1 & 0 & | & 4 \\ 0 & 0 & 1 & | & 3 \end{bmatrix}$

∴ $x = -4, y = 0, z = 0$ ∴ $x = -1, y = 4, z = 3$

7) Experiments have shown that cars (C), trucks (T), and trains (R) emit different amounts of air pollutants. In one such experiment, a truck emitted 0.8 lb of carbon dioxide per passenger-mile and 1 g of nitrogen oxide per passenger-mile. A car emitted 0.7 lb of CO_2 per passenger-mile and 0.9 g of NO per passenger-mile. A train emitted 0.5 lb of CO_2 per passenger-mile and 4 g of NO per passenger-mile. A total of 141 mi was driven by the three vehicles, and 82.7 lb of CO_2 and 424.4 g of NO were collected. Identify the variables and set up a system of equations to represent this situation.

8) The sum of three numbers is 24. Twice the smallest number is 2 less than the largest number, and the largest

$$\text{rref}\left(\begin{bmatrix} 1 & 0 & -6 & -4 \\ -6 & -5 & 3 & 24 \\ 2 & -5 & -6 & -8 \end{bmatrix}\right) \qquad \begin{bmatrix} 1 & 0 & 0 & -4 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

Steps : ① calculator

② menu

③ Matrix & vector

④ Red. row ech. form

⑤ Go back to menu and put in 3×4 matrix

   ~ Under create ▷ matrix

rows columns
↓   ↙

$$\text{rref}\left(\begin{bmatrix} 5 & -5 & 1 & -22 \\ 1 & 4 & -3 & 6 \\ -3 & 0 & -3 & -6 \end{bmatrix}\right) \qquad \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$