

Tuesday, October 25, 2016

Opener Below

HW Check and Questions

7.3 - Solving Systems using Reduced Row Echelon Form

HW: From Monday:

p. 553 #33-37, 55-59

Quest Friday!!!



opener ①

$$\begin{aligned} 2x + y + 2z &= 8 \\ 3x + 2y - z - w &= 10 \\ -2x + y - 3w &= -1 \\ 4x - 3y + 2z - 5w &= 39 \end{aligned}$$

$$A = \begin{bmatrix} 2 & 1 & 2 & 0 \\ 3 & 2 & -1 & -1 \\ -2 & 1 & 0 & -3 \\ 4 & -3 & 2 & -5 \end{bmatrix} \quad X = \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} \quad B = \begin{bmatrix} 8 \\ 10 \\ -1 \\ 39 \end{bmatrix}$$

Solve in Calculator
using Inverse Matrices

$$X = A^{-1}B = \begin{bmatrix} 4 \\ -2 \\ 1 \\ -3 \end{bmatrix} \quad \begin{aligned} x &= 4 \\ y &= -2 \\ z &= 1 \\ w &= -3 \end{aligned}$$

⑤⑩ $x + 2y = -2$
 $3x - 4y = 9$

$$A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix} \quad X = \begin{bmatrix} x \\ y \end{bmatrix} \quad B = \begin{bmatrix} -2 \\ 9 \end{bmatrix}$$

$$AX = B \quad X = A^{-1}B$$

$$A^{-1} = \frac{1}{-10} \begin{bmatrix} -4 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} \frac{2}{5} & \frac{1}{5} \\ \frac{3}{10} & -\frac{1}{10} \end{bmatrix}$$

$$X = \begin{bmatrix} \frac{2}{5} & \frac{1}{5} \\ \frac{3}{10} & -\frac{1}{10} \end{bmatrix} \cdot \begin{bmatrix} -2 \\ 9 \end{bmatrix} = \begin{bmatrix} 1 \\ -1.5 \end{bmatrix}$$

$$X = \begin{bmatrix} 1 \\ -1.5 \end{bmatrix}$$

$$-\frac{4}{5} + \frac{9}{5} = \frac{5}{5} = 1$$

$$\begin{aligned} -\frac{6}{10} + \frac{-9}{10} &= \frac{-15}{10} \\ &= \frac{-3}{2} = -1.5 \end{aligned}$$

$$y = -1.5$$

7.3 Solving Systems Using Reduced Row Echelon Form

Example 1 :

$$x - 2y + z = 7$$

$$3x - 5y + z = 14$$

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

\Rightarrow

augmented matrix

$$\begin{bmatrix} 1 & -2 & 1 & 7 \\ 3 & -5 & 1 & 14 \\ 2 & -2 & -1 & 3 \end{bmatrix}$$

in Matrix \rightarrow Math \rightarrow B

$$\text{rref}([A]) = \begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 3 \end{bmatrix} \Rightarrow \begin{array}{l} x = 2 \\ y = -1 \\ z = 3 \end{array}$$

* reduced row echelon form consists of identity matrix square and the solutions to the system.

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$$\begin{array}{l} x - y + 2z = -3 \\ 2x + y - z = 0 \\ -x + 2y - 3z = 7 \end{array}$$

Use Reduced Row Echelon Form to solve.

Augmented matrix :

$$\begin{bmatrix} 1 & -1 & 2 & -3 \\ 2 & 1 & -1 & 0 \\ -1 & 2 & -3 & 7 \end{bmatrix}$$

$$\text{rref}([A]) = \begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 7 \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

$$x = -2, y = 7, z = 3$$