

Today's Plan:

Learning Target (standard): I will review for the semester exam.

Students will: Complete practice problems over previous concepts at the boards and study for my exam.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of exam problems.

Assessment: Board work

Differentiation: Students will work at the board, actively engage in practice review concepts with the aid of other students and the teacher.

Find the inverse and verify it.

$$\begin{bmatrix} 8 & 3 \\ -3 & 5 \end{bmatrix} \quad D = 40 + 9 \\ D = 49$$

$$\left[\begin{array}{cc|cc} 8 & 3 & 1 & 0 \\ -3 & 5 & 0 & 1 \end{array} \right] \rightarrow \left[\begin{array}{cc|cc} 1 & \frac{3}{8} & 0 & -\frac{3}{8} \\ -3 & 5 & 0 & 1 \end{array} \right] \rightarrow \left[\begin{array}{cc|cc} 1 & \frac{3}{8} & 0 & -\frac{3}{8} \\ 0 & \frac{49}{8} & 1 & \frac{3}{8} \end{array} \right]$$

$$\rightarrow \left[\begin{array}{cc|cc} 1 & \frac{3}{8} & 0 & -\frac{3}{8} \\ 0 & 1 & \frac{3}{49} & \frac{8}{49} \\ 0 & -\frac{3}{8} & -\frac{9}{392} & -\frac{1}{49} \end{array} \right] \rightarrow \left[\begin{array}{cc|cc} 1 & 0 & \frac{5}{49} & -\frac{3}{49} \\ 0 & 1 & \frac{3}{49} & \frac{8}{49} \end{array} \right] \quad A^{-1} = \begin{bmatrix} \frac{5}{49} & -\frac{3}{49} \\ \frac{3}{49} & \frac{8}{49} \end{bmatrix}$$

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \quad A^{-1} = \frac{1}{D} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$\begin{bmatrix} 8 & 3 \\ -3 & 5 \end{bmatrix} \quad D = 49 \quad A^{-1} = \frac{1}{49} \begin{bmatrix} 5 & -3 \\ 3 & 8 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} \frac{5}{49} & -\frac{3}{49} \\ \frac{3}{49} & \frac{8}{49} \end{bmatrix} \checkmark$$

6) $\begin{bmatrix} 5 & -2 \\ -5 & 5 & -4 \\ -2 & 6 & 3 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -5 & -4 \\ 3 & 5 \end{bmatrix}$
 $(1 \times 2)(2 \times 3) = 1 \times 3$
 $= \begin{bmatrix} -15+4 & 15-12 & -12-6 \end{bmatrix}$
 $= \begin{bmatrix} -11 & 3 & -18 \end{bmatrix}$

7) Find the inverse of each matrix.
 $D = \begin{vmatrix} 8 & 3 \\ -3 & 5 \end{vmatrix} D = 40+9$
 $D = 49$
 $\begin{bmatrix} 8 & 3 & | & 1 & 0 \\ -3 & 5 & | & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & \frac{3}{8} & | & \frac{1}{8} & 0 \\ -3 & 5 & | & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & \frac{3}{8} & | & \frac{1}{8} & 0 \\ 0 & \frac{49}{8} & | & \frac{3}{8} & 1 \end{bmatrix}$
 $\begin{bmatrix} 1 & \frac{3}{8} & | & \frac{1}{8} & 0 \\ 0 & \frac{49}{8} & | & \frac{3}{8} & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & | & \frac{1}{49} & -\frac{3}{49} \\ 0 & 1 & | & \frac{3}{49} & \frac{8}{49} \end{bmatrix} A^{-1} = \begin{bmatrix} \frac{1}{49} & -\frac{3}{49} \\ \frac{3}{49} & \frac{8}{49} \end{bmatrix}$

8) $\begin{bmatrix} -8 & 9 \\ 0 & 7 \end{bmatrix}$
 $D = -56$
 $\begin{bmatrix} -8 & 9 & | & 1 & 0 \\ 0 & 7 & | & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} -8 & 9 & | & 1 & 0 \\ 0 & 7 & | & 0 & 1 \end{bmatrix}$

9) $2x + y = -10$
 $-2x - 2y = 12$
 $D = \begin{vmatrix} 2 & 1 \\ -2 & -2 \end{vmatrix} = -4+2$
 $D = -2$
 $D_x = \begin{vmatrix} -10 & 1 \\ 12 & -2 \end{vmatrix} = -20-12$
 $D_x = -32$
 $D_y = \begin{vmatrix} 2 & -10 \\ -2 & 12 \end{vmatrix} = 24-20$
 $D_y = 4$
 $x = \frac{D_x}{D} = \frac{-32}{-2} = 16$
 $y = \frac{D_y}{D} = \frac{4}{-2} = -2$
 independent
 $(-4, -2)$

10) $2x + 2z = -10$
 $6x + y + 6z = 4$
 $-x - 2y - z = 4$

Cramer's Rule.

$y=0$
 $2x + 2z = -10$
 $6x + y + 6z = 4$
 $-x - 2y - z = 4$

$D = \begin{vmatrix} 2 & 0 & 2 \\ 6 & 1 & 6 \\ -1 & -2 & -1 \end{vmatrix} = 2 \begin{vmatrix} 1 & 6 \\ -2 & -1 \end{vmatrix} + 0 + 2 \begin{vmatrix} 6 & 1 \\ -1 & -2 \end{vmatrix}$
 $= 2(-1+12) + 0 + 2(-12+1)$
 $= 22 - 22$
 $D = 0$

$D_x = \begin{vmatrix} -10 & 0 & 2 \\ 4 & 1 & 6 \\ 4 & -2 & -1 \end{vmatrix} = -10 \begin{vmatrix} 1 & 6 \\ -2 & -1 \end{vmatrix} + 0 + 2 \begin{vmatrix} 4 & 1 \\ 4 & -2 \end{vmatrix}$
 $= -10(-1+12) + 2(-8-4)$
 $= -110 - 24$
 $D_x = -134$

$x = \frac{D_x}{D} = \frac{-134}{0} = \text{und}$

inconsistent
 no solution

Solve each system using the matrix method.

11) $-10x + 2y = 20$
 $-9x - y = -10$

$$\begin{bmatrix} -10 & 2 & : & 20 \\ -9 & -1 & : & -10 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -\frac{2}{5} & : & -2 \\ -9 & -1 & : & -10 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -\frac{2}{5} & : & -2 \\ 0 & -\frac{14}{5} & : & -28 \end{bmatrix}$$

$\rightarrow \begin{bmatrix} 1 & -\frac{2}{5} & : & -2 \\ 0 & 1 & : & 10 \end{bmatrix}$ $x - \frac{2}{5}y = -2$ $x - \frac{2}{5}(10) = -2$
 $y = 10$ $x - 2 = -2$
 $x = 0$

independent
 $(0, 10)$

12) $-4r - s - 6t = 17$
 $-4r + s = 25$
 $2r - 4s + t = -15$

Identify the domain of each. Is the function even, odd, or neither? Support your choice.

13) $f(x) = \frac{x-1}{3x^2-9x}$ 14) $f(x) = \frac{x^2-9}{-4x+16}$

-3-

Matrix Method.

$-4r - s - 6t = 17$
 $-4r + s = 25$
 $2r - 4s + t = -15$

$$\begin{bmatrix} -4 & 1 & 0 & : & 25 \\ -4 & -1 & -6 & : & 17 \\ 2 & -4 & 1 & : & -15 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & -\frac{1}{4} & 0 & : & -\frac{25}{4} \\ -4 & -1 & -6 & : & 17 \\ 2 & -4 & 1 & : & -15 \end{bmatrix}$$

$\rightarrow \begin{bmatrix} 1 & -\frac{1}{4} & 0 & : & -\frac{25}{4} \\ 0 & -2 & -6 & : & -8 \\ 2 & -4 & 1 & : & -15 \end{bmatrix}$ $x - \frac{1}{4}y = -\frac{25}{4}$
 $y + 3z = 4$

$\rightarrow \begin{bmatrix} 1 & -\frac{1}{4} & 0 & : & -\frac{25}{4} \\ 0 & 1 & 3 & : & 4 \\ 0 & -\frac{7}{2} & 1 & : & -\frac{5}{2} \end{bmatrix}$ $z = 1$

$\rightarrow \begin{bmatrix} 1 & -\frac{1}{4} & 0 & : & -\frac{25}{4} \\ 0 & 1 & 3 & : & 4 \\ 0 & 0 & 1 & : & 1 \end{bmatrix}$ $x - \frac{1}{4}y = -\frac{25}{4}$
 $y + 3z = 4$
 $z = 1$

independent
 $(-6, 1, 1)$