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 accuarcy 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.

Board Practice

Evaluate each determinant.

1) $\begin{vmatrix} -4 & 5 \\ -1 & -3 \end{vmatrix}$ $= 12 + 5$

$D = 17$

2) $\begin{vmatrix} 4 & 5 & -1 \\ 3 & 5 & -4 \\ -4 & 0 & -1 \end{vmatrix}$

$= 4\begin{vmatrix} 5 & -4 \\ 0 & -1 \end{vmatrix} - 5\begin{vmatrix} 3 & -4 \\ -4 & -1 \end{vmatrix} - 1\begin{vmatrix} 3 & 5 \\ -4 & 0 \end{vmatrix}$

$= 4(-5-0) - 5(-3-16) - 1(0+20)$

$= -20 + 95 - 20$

$D = 55$

Simplify. Write "undefined" for expressions that are undefined.

3) $\begin{bmatrix} -3 & 1 & 2 & -6 \end{bmatrix} + \begin{bmatrix} 0 & -3 & 2 & -6 \end{bmatrix} - \begin{bmatrix} -2 & 5 & 4 & 0 \end{bmatrix}$

$= \begin{bmatrix} -3 & -2 & 4 & -12 \end{bmatrix} + \begin{bmatrix} 2 & -5 & -4 & 0 \end{bmatrix}$

$= \begin{bmatrix} -1 & -7 & 0 & -12 \end{bmatrix}$

4) $-4\left(\begin{bmatrix} -3 & -4 & 3 \\ -3 & 2 & 4 \end{bmatrix} + \begin{bmatrix} 2 & -6 & -4 \\ -6 & 0 & -2 \end{bmatrix}\right)$

$= -4\begin{bmatrix} -1 & -10 & -1 \\ -9 & 2 & 2 \end{bmatrix}$

$= \begin{bmatrix} 4 & 40 & 4 \\ 36 & -8 & -8 \end{bmatrix}$

$(2\times2)(2\times2) = 2\times2$ ✓

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

$= \begin{bmatrix} 18+8 & 6+10 \\ -15-4 & -5-5 \end{bmatrix}$

$= \begin{bmatrix} 26 & 16 \\ -19 & -10 \end{bmatrix}$

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

$(1\times2)(2\times3) = 1\times3$

$(1\times3)(3\times2) = 1\times2$

$= \begin{bmatrix} -15+4 & 15-12 & -12-6 \end{bmatrix}$

$= \begin{bmatrix} -11 & 3 & -18 \end{bmatrix}$

$\begin{bmatrix} -11 & 3 & -18 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ -5 & -4 \\ 3 & 5 \end{bmatrix}$

$= \begin{bmatrix} -11-15-54 & 22-12-90 \end{bmatrix}$

$= \begin{bmatrix} -80 & -80 \end{bmatrix}$

Find the inverse of each matrix.

7) $\begin{bmatrix} 8 & 3 \\ -3 & 5 \end{bmatrix}$

$D = 40+9$

$D = 49$

$\begin{bmatrix} 8 & 3 & 1 & 0 \\ -3 & 5 & 0 & 1 \end{bmatrix} \to \begin{bmatrix} 1 & \frac{3}{8} & \frac{1}{8} & 0 \\ -3 & 5 & 0 & 1 \end{bmatrix} \to \begin{bmatrix} 1 & \frac{3}{8} & \frac{1}{8} & 0 \\ 0 & \frac{49}{8} & \frac{3}{8} & 1 \end{bmatrix}$

$\to \begin{bmatrix} 1 & \frac{3}{8} & \frac{1}{8} & 0 \\ 0 & 1 & \frac{3}{49} & \frac{8}{49} \end{bmatrix} \to \begin{bmatrix} 1 & 0 & \frac{5}{49} & -\frac{3}{49} \\ 0 & 1 & \frac{3}{49} & \frac{8}{49} \end{bmatrix}$

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

8) $\begin{bmatrix} -8 & 9 \\ 0 & 7 \end{bmatrix}$

Use Cramer's Rule to solve each system.

9) $2x + y = -10$
$-2x - 2y = 12$

$D = \begin{vmatrix} 2 & 1 \\ -2 & -2 \end{vmatrix} = -4+2$

$D = -2$

$D_x = \begin{vmatrix} -10 & 1 \\ 12 & -2 \end{vmatrix} = 20-12$

$D_x = 8$

$D_y = \begin{vmatrix} 2 & -10 \\ -2 & 12 \end{vmatrix} = 24-20$

$D_y = 4$

$x = \frac{D_x}{D}$

$y = \frac{D_y}{D}$

independent

$(-4, -2)$

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

Cramer's Rule.

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

$y=0$

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

$$= 2(-1+12) + 0 + 2(-12+1)$$

$$= 22 - 22$$

$$D = 0$$

$$D_x = \begin{vmatrix} -10 & 0 & 2 \\ 4 & 1 & 6 \\ 4 & -2 & -1 \end{vmatrix} = -10\begin{vmatrix} 1 & 6 \\ -2 & -1 \end{vmatrix} + 0 + 2\begin{vmatrix} 4 & 1 \\ 4 & -2 \end{vmatrix}$$

$$= -10(-1+12) + 2(-8-4)$$

$$= -110 - 24$$

$$D_x = -134$$

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

inconsistent
no solution

Solve each system using the matrix method.

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

$\begin{bmatrix} -10 & 2 & 20 \\ -9 & -1 & -10 \end{bmatrix} \to \begin{bmatrix} 1 & -\frac{1}{5} & -2 \\ -9 & -1 & -10 \end{bmatrix}$ (9, $-\frac{9}{5}$, -18)

$\to \begin{bmatrix} 1 & -\frac{1}{5} & -2 \\ 0 & -\frac{14}{5} & -28 \end{bmatrix} \to \begin{bmatrix} 1 & -\frac{1}{5} & -2 \\ 0 & 1 & 10 \end{bmatrix}$

$x - \frac{1}{5}y = -2$ $\quad x - 2 = -2$

$y = 10$ $\quad x = 0$

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) $f(x) = \frac{x-1}{3x^2 - 9x}$

$3x(x-3) = 0$

$x = 0, 3$

$D: \{x \mid x \neq 0, 3\}$

$f(-x) = \frac{-x-1}{3(-x)^2 - 9(-x)}$

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

∴ neither

$f(-x) \neq f(x)$

$f(-x) \neq -f(x)$

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

$-4x + 16 = 0$

$-4x = -16$

$x = 4$

$D: \{x \mid x \neq 4\}$

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

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

∴ neither

$f(-x) \neq f(x)$

$f(-x) \neq -f(x)$

Matrix Method.

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

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

$$\to \begin{bmatrix} 1 & -\frac{1}{4} & 0 & -\frac{25}{4} \\ 0 & -2 & -6 & -8 \\ 2 & -4 & 1 & -15 \end{bmatrix} \to \begin{bmatrix} 1 & -\frac{1}{4} & 0 & -\frac{25}{4} \\ 0 & -2 & -6 & -8 \\ 0 & -\frac{7}{2} & 1 & -\frac{5}{2} \end{bmatrix}$$

$$\to \begin{bmatrix} 1 & -\frac{1}{4} & 0 & -\frac{25}{4} \\ 0 & 1 & 3 & 4 \\ 0 & -\frac{7}{2} & 1 & -\frac{5}{2} \end{bmatrix} \to \begin{bmatrix} 1 & -\frac{1}{4} & 0 & -\frac{25}{4} \\ 0 & 1 & 3 & 4 \\ 0 & 0 & \frac{23}{2} & \frac{23}{2} \end{bmatrix}$$

$$\to \begin{bmatrix} 1 & -\frac{1}{4} & 0 & -\frac{25}{4} \\ 0 & 1 & 3 & 4 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

$x - \frac{1}{4}y = -\frac{25}{4}$

$y + 3z = 4$

$z = 1$

$y + 3 = 4$

$y = 1$

$x - \frac{1}{4} = -\frac{25}{4}$

$x = -6$

independent

$(-6, 1, 1)$