Test On Matrices (Pre Calculus) In-class **Name** KEY

Section 1: Determining Consistent, Inconsistent and Dependent, Independent Lines
Consider the system of equations and identify the relationship as indicated above.

1. $3x-4y=20$; $y=\frac{3}{4}x-5$ — $m=\frac{3}{4}$, $m=\frac{3}{4}$ — LINES COINCIDE; CONSISTENT; SAME SLOPE; DEPENDENT

1. CONSISTENT / DEPENDENT

2. $2x-5y=11$; $y=\frac{3}{4}x+2$ — $m=\frac{2}{5}$, $m=\frac{3}{4}$ — LINES MUST CROSS; CONSISTENT; DIFFERENT SLOPE; INDEPENDENT

2. CONSISTENT / INDEPENDENT

3. $x+3y=15$; $y=\frac{-1}{3}x+2$ — $m=-\frac{1}{3}$, $m=-\frac{1}{3}$ — LINE PARALLEL; INCONSISTENT; SAME SLOPE; DEPENDENT

3. INCONSISTENT / DEPENDENT

Section 2: Solving Systems with Augmented Matrices

Write an **augmented matrix** for the system of equations then **solve** using the **reduced row echelon form** option in the calculator. **Rational solutions** should be represented as **proper fractions** or **mixed numbers** when appropriate.

4. $6x-y+2z=6$
   $9x+4y-4z=0$
   $12x-7y+8z=19$

ENTER 3 x 4 MATRIX
THEN USE RREF OPTION

4. $\begin{bmatrix} 6 & -1 & 2 & 6 \\ 9 & 4 & -4 & 0 \\ 12 & -7 & 8 & 19 \end{bmatrix}$

Solution: $(\frac{2}{3}, -1, \frac{1}{2})$

5. $4x-5y+3z=-9$
   $6x+20y-2z=28$
   $8x-10y+9z=-27$

5. $\begin{bmatrix} 4 & -5 & 3 & -9 \\ 6 & 20 & -2 & 28 \\ 8 & -10 & 9 & -27 \end{bmatrix}$

Solution: $(1, \frac{4}{5}, -3)$

Section 2: Operations with Matrices

Given the Following Matrices, complete the indicated operations.

$$A=\begin{bmatrix}2 & -5\\ 4 & 3\end{bmatrix} \quad B=\begin{bmatrix}6 & -8\\ -2 & 4\end{bmatrix} \quad C=\begin{bmatrix}6 & 8 & -4\\ 2 & -4 & 10\end{bmatrix} \quad D=\begin{bmatrix}-2 & -4 & -4 & 2\\ 6 & -8 & 12 & 4\\ 4 & 6 & 8 & 14\end{bmatrix}$$

$$E=\begin{bmatrix}-5 & 2 & -4 & 1\\ 3 & 6 & 7 & -13\\ -5 & 8 & -7 & -2\end{bmatrix} \quad F=\begin{bmatrix}-3 & -1 & 5 & 7\\ 5 & 3 & 11 & -3\\ -1 & -9 & 7 & 15\end{bmatrix} \quad G=\begin{bmatrix}-7 & 3 & -5\\ -3 & -9 & 1\end{bmatrix}$$

6. Find 4E –5F+2D

$4\times[E]-5\times[F]+2\times[D]$

6.

$$\begin{bmatrix}-9 & 5 & -49 & -27\\ -1 & -7 & -3 & -29\\ -7 & 89 & -47 & -55\end{bmatrix}$$

7. Find **Matrix Y** if $2\mathbf{X}+3C=4G$

Solve: $Y=\frac{1}{2}\times\left(4\times[G]-3\times[C]\right)$

7.

$$\begin{bmatrix}-23 & -6 & -4\\ -9 & -12 & -13\end{bmatrix}$$

8. Find **Matrix L** if $GD–C[\,2F+4D\,]=B\mathbf{L}$

$[B]^{-1}\times\left([G]\times[D]-[C]\times\left(2\times[F]+4\times[D]\right)\right)=L$

8.

$$\begin{bmatrix}-80 & 119 & -414 & -862\\ -45 & 50 & -271 & -645\end{bmatrix}$$

9. Find $3|A|-5|B|$

(Three times determinant of A minus five times determinant of B)

9. 38

10. Solve the system of equations generated from these determinants. **(Integer Coordinates)**

$\begin{vmatrix} 3x-2 & 3 \\ 5y+7 & -2 \end{vmatrix} = 25$ $\quad$ $\begin{vmatrix} 4x-7 & -2 \\ y+3 & 3 \end{vmatrix} = 13$ $\quad$ $\begin{bmatrix} -6 & -15 & 42 \\ 12 & 2 & 28 \end{bmatrix}$

$-2(3x-2) - 3(5y+7) = 25$ $\quad$ $3(4x-7) + 2(y+3) = 13$

$-6x+4 - 15y - 21 = 25$ $\quad$ $12x - 21 + 2y + 6 = 13$

$-6x - 15y = 42$ $\quad$ $12x + 2y = 28$

10. $(3, -4)$

11. Solve the system of equations generated from these determinants. **(Integer Coordinates)**

$\begin{vmatrix} 4 - \frac{1}{3}x & -4 \\ 2y+3 & \frac{1}{3} \end{vmatrix} = 4\frac{1}{3}$ $\quad$ $\begin{vmatrix} \frac{1}{2}x - 4 & -3 \\ \frac{1}{3}y + 5 & 4 \end{vmatrix} = 16$ $\quad$ $\begin{bmatrix} -1/9 & 8 & -8 \\ 2 & 1 & 17 \end{bmatrix}$

$\frac{1}{3}(4 - \frac{1}{3}x) + 4(2y+3) = 4\frac{1}{3}$ $\quad$ $4(\frac{1}{2}x - 4) + 3(\frac{1}{3}y + 5) = 16$

$\frac{4}{3} - \frac{1}{9}x + 8y + 12 = 4\frac{1}{3}$ $\quad$ $2x - 16 + y + 15 = 16$

$-\frac{1}{9}x + 8y = -8$ $\quad$ $2x + y = 17$

11. $(9, -1)$

12. Find the area of the triangle with vertices at (–3 , 9) , (8, 2), (5, 3)

$\frac{1}{2}\,\text{DET}([A])$ $\quad$ $[A] = \begin{bmatrix} -3 & 9 & 1 \\ 8 & 2 & 1 \\ 5 & 3 & 1 \end{bmatrix}$

12. 5 UNITS^2

13. Find the area of the triangle with vertices at (11 , 5) , (9, –2), (–2, 3)

$\frac{1}{2}\,\text{DET}([A])$ $\quad$ $[A] = \begin{bmatrix} 11 & 5 & 1 \\ 9 & -2 & 1 \\ -2 & 3 & 1 \end{bmatrix}$

13. $43\frac{1}{2}$ UNITS^2

14. Solve the matrix Equation $\begin{bmatrix} -4 & 1 & 3 \\ 2 & -3 & 5 \\ 5 & 6 & -2 \end{bmatrix} \bullet \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -17 \\ 29 \\ 3 \end{bmatrix}$

$[A]$ $\quad$ $[B]$

(Integer Solutions)

$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = [A]^{-1}[B]$

14. $(5, -3, 2)$

15. Solve the matrix Equation $2\begin{bmatrix} 3 & -2 & 3 \\ 5 & -3 & 7 \\ 4 & 5 & 9 \end{bmatrix} \bullet \begin{bmatrix} x \\ y \\ z \end{bmatrix} - 3\begin{bmatrix} 8 & -2 & 4 \\ 6 & -8 & 7 \\ 3 & 11 & -3 \end{bmatrix} \bullet \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -34 \\ 28 \\ -189 \end{bmatrix}$

$[A]$ $\quad$ $[B]$ $\quad$ $[C]$

(Integer Solutions)

$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = (2\times[A] - 3\times[B])^{-1} \times [C]$

15. $(4, 1, -6)$