DETERMINANT

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$$

1. $\begin{vmatrix} 3 & -4 \\ 5 & -2 \end{vmatrix} = 3(-2) - 5(-4) = -6 + 20 = 14$

2. $\begin{vmatrix} \frac{1}{3} & \frac{2}{7} \\ -7 & 3 \end{vmatrix} = 3\left(\frac{1}{3}\right) - \frac{2}{7}(-7) = 1 + 2 = 3$

3. $7x - 2y = 33$, $3x + 4y = 19$

$$\left[\begin{array}{cc|c} 7 & -2 & 33 \\ 3 & 4 & 19 \end{array}\right]$$

$$D = \begin{vmatrix} 7 & -2 \\ 3 & 4 \end{vmatrix} = 7(4) - 3(-2) = 34$$

$$D_x = \begin{vmatrix} 33 & -2 \\ 19 & 4 \end{vmatrix} = 33(4) - 19(-2) = 132 + 38 = 170$$

$$D_y = \begin{vmatrix} 7 & 33 \\ 3 & 19 \end{vmatrix} = 7(19) - 33(3) = 133 - 99 = 34$$

$$x = \frac{D_x}{D} = \frac{170}{34} = 5$$

$$y = \frac{D_y}{D} = \frac{34}{34} = 1$$

$(5, 1)$

4. $3x - y = 2$, $6x = 4 + 2y$ → $3x - y = 2$, $6x - 2y = 4$

$$D = \begin{vmatrix} 3 & -1 \\ 6 & -2 \end{vmatrix} = 3(-2) - 6(-1) = 0$$

$$D_x = \begin{vmatrix} 2 & -1 \\ 4 & -2 \end{vmatrix} = 2(-2) - 4(-1) = 0$$

$$D_y = \begin{vmatrix} 3 & 2 \\ 6 & 4 \end{vmatrix} = 3(4) - 6(2) = 0$$

$$x = \frac{D_x}{D} = \frac{0}{0}$$

$$y = \frac{D_y}{D} = \frac{0}{0}$$

INFINITE SOLUTIONS USE RREF

5. $x + 5y = 3$, $15y = 7 - 3x$ → $x + 5y = 3$, $3x + 15y = 7$

$$D = \begin{vmatrix} 1 & 5 \\ 3 & 15 \end{vmatrix} = 1(15) - 3(5) = 0$$

$$D_x = \begin{vmatrix} 3 & 5 \\ 7 & 15 \end{vmatrix} = 3(15) - 7(5) = 45 - 35 = 10$$

$$D_y = \begin{vmatrix} 1 & 3 \\ 3 & 7 \end{vmatrix} = 1(7) - 3(3) = -2$$

$$x = \frac{D_x}{D} = \frac{10}{0}$$

$$y = \frac{D_y}{D} = \frac{-2}{0}$$

NO SOL.