

When given a system of equations,

$$ax + by = e$$

$$cx + dy = f$$

We can create a coefficient matrix from the coefficients of the variables.

$$\det \begin{bmatrix} a & b \\ c & d \end{bmatrix} = D$$

When given a system of equations,

$$ax + by = e$$

$$cx + dy = f$$

both equations in standard form

has solutions, $x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D}$ and $y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$

D = determinant of the coefficient matrix

This is known as Cramer's Rule for Two Equations

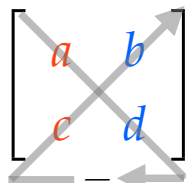
Steps to Use Cramer's Rule

1. Put equations in standard form...

$$ax + by = e$$

$$cx + dy = f$$

2. Create a coefficient matrix

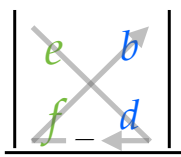


$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

3. Find determinant of coefficient matrix

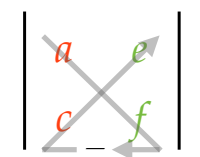
$$\text{Set} = D$$

4. Calculate value of x .



$$x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D}$$

5. Calculate value of y .



$$y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$$

Use Cramer's Rule to solve the following system of equations

$$2x + 2y = -2$$

$$3x + 4y = -5$$

Use Cramer's Rule to solve the following system of equations

$$x + y = 9$$

$$3x - y = 3$$

Use Cramer's Rule to solve the following system of equations

$$3x - 9 = 3y$$

$$y = 2x + 1$$

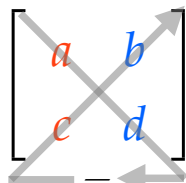
Steps to Use Cramer's Rule

1. Put equations in standard form...

$$ax + by = e$$

$$cx + dy = f$$

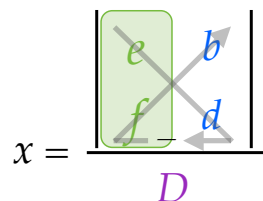
2. Create a coefficient matrix

A 2x2 matrix with elements a, b, c, and d. A green box highlights the elements a and b in the first row. A green box highlights the elements c and d in the second row. A green box highlights the element a in the first row. A green box highlights the element c in the second row. A green box highlights the element b in the first row. A green box highlights the element d in the second row. A green box highlights the element a in the first row. A green box highlights the element c in the second row. A green box highlights the element b in the first row. A green box highlights the element d in the second row.

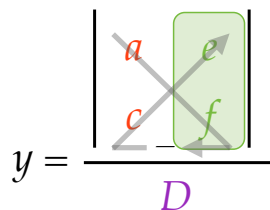
3. Find determinant of coefficient matrix

$$\text{Set} = D$$

4. Calculate value of x .

A 2x2 matrix with elements e, b, f, and d. A green box highlights the elements e and b in the first row. A green box highlights the elements f and d in the second row. A green box highlights the element e in the first row. A green box highlights the element f in the second row. A green box highlights the element b in the first row. A green box highlights the element d in the second row. A green box highlights the element e in the first row. A green box highlights the element f in the second row. A green box highlights the element b in the first row. A green box highlights the element d in the second row.
$$x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{D}$$

5. Calculate value of y .

A 2x2 matrix with elements a, e, c, and f. A green box highlights the elements a and e in the first row. A green box highlights the elements c and f in the second row. A green box highlights the element a in the first row. A green box highlights the element c in the second row. A green box highlights the element e in the first row. A green box highlights the element f in the second row. A green box highlights the element a in the first row. A green box highlights the element c in the second row. A green box highlights the element e in the first row. A green box highlights the element f in the second row.
$$y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{D}$$