Cramer's Rule

In linear algebra, Cramer's rule is an explicit formula for the solution of a system of lienar equations with as many equations as unknowns, valid whenever the system has a unique solution.

Explicit formulas for small systems

Consider the system of equations below

$$\begin{bmatrix} a_1 & b_1 a_2 & b_2 \end{bmatrix} * \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix}$$

solving this by taking inverse and determinants we get the equations

$$x = \frac{\begin{vmatrix} c_1 & b_1 \\ c_2 & b_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}} = \frac{c_1 b_2 - b_1 c_2}{a_1 b_2 - b_1 a_2}$$

and similarly for y

$$y = \frac{\begin{vmatrix} a_1 & c_1 \\ a_2 & c_2 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}} = \frac{a_1 c_2 - c_1 a_2}{a_1 b_2 - b_1 a_2}$$

This rule can extend into 3x3 matricies just the same. For more on that click here

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