

Algebra 2

3.7

Evaluate determinants

$$\begin{vmatrix} 3 & 1 \\ 5 & 7 \end{vmatrix}$$

5

21

$$21 - 5 = 16$$

Use Cramer's rule to solve systems of equations

second order determinant

third order determinant

Cramer's rule

coefficient matrix

variable matrix

whiteboards

graphing calcs

Guided Practice

1A. $\begin{vmatrix} -6 & -7 \\ 10 & 8 \end{vmatrix}$ -70
 $-48 - -70$
 -48

1B. $\begin{vmatrix} 7 & 5 \\ 9 & -4 \end{vmatrix}$

Guided Practice

Evaluate each ~~determinant~~.

2A. $\begin{vmatrix} -5 & 9 & 4 \\ -2 & -1 & 5 \\ -4 & 6 & 2 \end{vmatrix}$

2B. $\begin{vmatrix} -8 & -4 & 4 \\ 0 & -5 & -8 \\ 3 & 4 & 1 \end{vmatrix}$

$$16 + -150 + -36 = -170$$

$\begin{matrix} -5 & 9 & 4 \\ -2 & -1 & 5 \\ -4 & 6 & 2 \end{matrix}$

$$-218 + 170 = -48$$

$$10 + -180 + -48 = -218$$

KeyConcept Cramer's Rule

Let C be the coefficient matrix of the system $ax + by = m$
 $fx + gy = n \rightarrow \begin{bmatrix} a & b \\ f & g \end{bmatrix}$.

The solution of this system is $x = \frac{\begin{vmatrix} m & b \\ n & g \end{vmatrix}}{|C|}$ and $y = \frac{\begin{vmatrix} a & m \\ f & n \end{vmatrix}}{|C|}$, if $|C| \neq 0$.

coefficient matrix (C)

Cramer's rule: systems of 2 eq

5B. $6x + 5y + \cancel{2z} = -1$
 $-x + 3y + \cancel{7z} = 12$
 $5x - 7y - \cancel{3z} = -52$

Cramer's rule system of 3 eq

$$\begin{pmatrix} -1536 & 1920 & -384 \\ 384 & 384 & 384 \\ -4 & 5 & -1 \end{pmatrix}$$

$$, + -294 + 15 = -249$$

$$135 + 249$$

$$-312 + 49 + -180 = -443$$

$$-1979 + 443 = -1536$$

$$9 + -1820 + -168 = -1979$$

$$X = \begin{pmatrix} -1 & 5 & 3 & -1 & 5 \\ 12 & 3 & 7 & 12 & 3 \\ -52 & -7 & -3 & -52 & -7 \end{pmatrix}$$

$$\begin{pmatrix} 6 & 5 & 2 & 6 & 5 \\ -1 & 3 & 7 & -1 & 3 \\ 5 & -7 & -3 & 5 & -7 \end{pmatrix}$$

graphing calcs

2nd matrix

2x2 Show the work
3x3+ Can use calc

$$8x - 4y + 7z = 34$$

$$5x + 6y + 3z = -21$$

$$3x + 7y - 8z = -85$$

3.7 p. 194

14 - 46 even

$$\left| \begin{array}{ccc} 8 & -4 & 7 \\ 5 & 6 & 3 \\ 3 & 7 & -8 \end{array} \right|$$