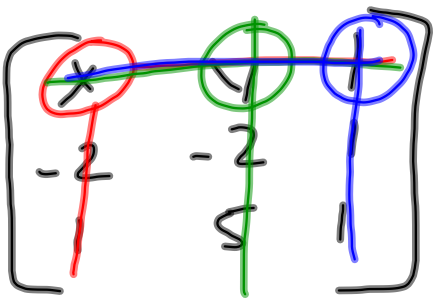
30

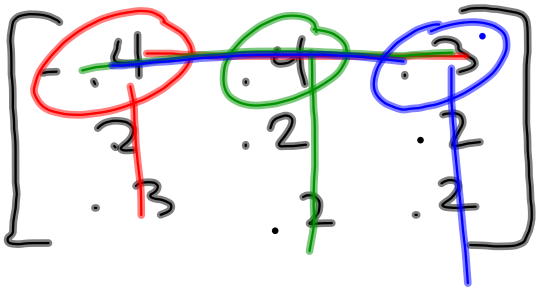


$$x\begin{vmatrix} -2 & 1 \\ 5 & 1 \end{vmatrix} - y\begin{vmatrix} -2 & 1 \\ 1 & 1 \end{vmatrix} + 1\begin{vmatrix} -2 & -2 \\ 1 & 5 \end{vmatrix}$$

$$x(-2-5) - y(-2-1) + 1(-10--2)$$

$$-7x + 3y - 8$$

28.



$$-.4\begin{vmatrix} .2 & .2 \\ .2 & .2 \end{vmatrix} - .4\begin{vmatrix} .2 & .2 \\ .3 & .2 \end{vmatrix} + .3\begin{vmatrix} .2 & .2 \\ .3 & .2 \end{vmatrix}$$

$$-.4(.04-.04) - .4(.04-.06) + .3(.04-.06)$$

$$-.4(-.02) + .3(-.02)$$

0 5 +
6-10 ✓
11 ↑ −

4.4 Cramer's Rule

2x2 system:

For the system $\begin{cases} a_1x + b_1y = c_1 \\ a_2x + b_2y = c_2 \end{cases}$

the solution is:

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

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

Example: solve

$$\begin{cases} 4x-2y=10 \\ 3x-5y=11 \end{cases}$$

using Cramer's rule.

$$x=\frac{\begin{vmatrix}10 & -2\\ 11 & -5\end{vmatrix}}{\begin{vmatrix}4 & -2\\ 3 & -5\end{vmatrix}} \qquad y=\frac{\begin{vmatrix}4 & 10\\ 3 & 11\end{vmatrix}}{-14}$$

$$x=\frac{-50--22}{-20--6} \qquad y=\frac{44-30}{-14}$$

$$x=\frac{-28}{-14} \qquad y=\frac{14}{-14}$$

$$x=2 \qquad y=-1$$

$$(2,-1)$$

3x3 system

for the system $\begin{cases} a_1x + b_1y + c_1z = d_1 \\ a_2x + b_2y + c_2z = d_2 \\ a_3x + b_3y + c_3z = d_3 \end{cases}$

the solution is:

$$X = \frac{\begin{vmatrix} d_1 & b_1 & c_1 \\ d_2 & b_2 & c_2 \\ d_3 & b_3 & c_3 \end{vmatrix}}{\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = D}$$

$$Y = \frac{\begin{vmatrix} a_1 & d_1 & c_1 \\ a_2 & d_2 & c_2 \\ a_3 & d_3 & c_3 \end{vmatrix}}{D}$$

$$Z = \frac{\begin{vmatrix} a_1 & b_1 & d_1 \\ a_2 & b_2 & d_2 \\ a_3 & b_3 & d_3 \end{vmatrix}}{D}$$

Ex: Solve $\begin{cases} -x+2y-3z=1 \\ 2x \quad +z=0 \\ 3x-4y+4z=2 \end{cases}$

Using Cramer's Rule

$$x=\frac{\begin{vmatrix} 1 & 2 & -3 \\ 0 & 0 & 1 \\ 2 & -4 & 4 \end{vmatrix}}{\begin{vmatrix} -1 & 2 & -3 \\ 2 & 0 & 1 \\ 3 & -4 & 4 \end{vmatrix}} \qquad y=\frac{\begin{vmatrix} -1 & 1 & -3 \\ 2 & 0 & 1 \\ 3 & 2 & 4 \end{vmatrix}}{\begin{vmatrix} -1 & 2 & -3 \\ 2 & 0 & 1 \\ 3 & -4 & 4 \end{vmatrix}}$$

$$z=\frac{\begin{vmatrix} -1 & 2 & 1 \\ 2 & 0 & 0 \\ 3 & -4 & 2 \end{vmatrix}}{\begin{vmatrix} -1 & 2 & -3 \\ 2 & 0 & 1 \\ 3 & -4 & 4 \end{vmatrix}}$$

$x=\frac{8}{10} \quad y=\frac{-15}{10} \quad z=\frac{-16}{10}$

$x=\frac{4}{5} \quad y=\frac{-3}{2} \quad z=\frac{-8}{5}$

$\left(\frac{4}{5}, -\frac{3}{2}, -\frac{8}{5}\right)$

hw: p. 283

44-58 even

odds + xtra credit

2x2 no calc

3x3 calc