

Chapter M Section 3 Cramer's Rule

Graphing method (graph two lines, see where they intersect), substitution method (sub one equation into the other), elimination method (combine the equations to make one variable cancel out) AND NOW... CRAMER'S RULE!

- 1) Solve the system of equations: $5x + 7y = 13$
 $2x - 5y = 13$

Standard form: $Ax + By = C$

- 1) Find the answer for "x". Make a 2 X 2 matrix, but put C where A was.
- 2) Find the answer for "y". Make a 2 X 2 matrix, but put the C where B was.
- 3) Make a 2 X 2 matrix with A & B, leaving C out.
- 4) Divide the determinant from part 1 by the determinant for part 3 (this gives you the x-coordinate)
- 5) Divide the determinant from part 2 by the determinant for part 3 (this gives you the y-coordinate)

$$x = \frac{\begin{vmatrix} 13 & 7 \\ 13 & -5 \end{vmatrix}}{\begin{vmatrix} 5 & 7 \\ 2 & -5 \end{vmatrix}} = \frac{(13)(-5) - (7)(13)}{(5)(-5) - (7)(2)} = \frac{-156}{-39} = 4$$

$$y = \frac{\begin{vmatrix} 5 & 13 \\ 2 & 13 \end{vmatrix}}{\begin{vmatrix} 5 & 7 \\ 2 & -5 \end{vmatrix}} = \frac{(5)(13) - (13)(2)}{(5)(-5) - (7)(2)} = \frac{39}{-39} = -1$$

Answer: (4, -1)

- 2) Solve the system of equations: $x - 4y = 1$
 $2x + 3y = 24$

$$x = \frac{\begin{vmatrix} 1 & -4 \\ 24 & 3 \end{vmatrix}}{\begin{vmatrix} 1 & -4 \\ 2 & 3 \end{vmatrix}} = \frac{(1)(3) - (-4)(24)}{(1)(3) - (-4)(2)} = \frac{99}{11} = 9$$

$$y = \frac{\begin{vmatrix} 1 & 1 \\ 2 & 24 \end{vmatrix}}{\begin{vmatrix} 1 & -4 \\ 2 & 3 \end{vmatrix}} = \frac{(1)(24) - (1)(2)}{(1)(3) - (-4)(2)} = \frac{22}{11} = 2$$

Answer: (9, 2)

BONUS ROUND

- 3) Solve the system of equations: $3x + y + z = -1$
 $-6x + 5y + 3z = -9$
 $9x - 2y - z = 5$

