Worksheet: Cramer's Rule

Summary of Cramer's Rule (two equations, two variables):

To solve a system of like the one shown, we can write the solution immediately as a fraction using determinants:

$$\begin{aligned} ax + by &= e \\ cx + dy &= f \end{aligned} \quad \Rightarrow \quad x = \frac{\begin{vmatrix} e & b \\ f & d \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}} \qquad y = \frac{\begin{vmatrix} a & e \\ c & f \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}}$$

Of course, this only works if the denominator is not zero, which occurs in two cases: The two lines are parallel (in which there is no solution), or the two lines are actually the same (so any x, y that satisifies the line is a solution).

Use Cramer's Rule to solve the following systems, if a solution exists. If there is no solution, state why. If there are an infinite number of solutions, give the line of solutions.

1. $\begin{aligned} C_1 + C_2 &= 2 \\ -2C_1 - 3C_2 &= 3 \end{aligned}$

2. $\begin{aligned} C_1 + C_2 &= y_0 \\ r_1C_1 + r_2C_2 &= v_0 \end{aligned}$.

   How does the solution depend on r_1, r_2?

3. $\begin{aligned} C_1 + C_2 &= 2 \\ 3C_1 + C2 &= 1 \end{aligned}$

4. $\begin{aligned} 2C_1 - 5C_2 &= 3 \\ 6C1 - 15C_2 &= 10 \end{aligned}$

5. $\begin{aligned} 2C_1 - 5C_2 &= 3 \\ 6C1 - 15C_2 &= 9 \end{aligned}$

6. $\begin{aligned} 2C_1 - 3C_2 &= -1 \\ 3C_1 - 2C_2 &= 1 \end{aligned}$