10.2: Linear Systems of Equations: Three Equations

Supplementary Notes

$$\begin{cases} a_{11}x + a_{12}y + a_{13}z &= b_1 \\ a_{21}x + a_{22}y + a_{23}z &= b_2 \\ a_{31}x + a_{32}y + a_{33}z &= b_3 \end{cases}$$

where a_{ij} and b_i $(1 \le i, j \le 3)$ are real numbers. A linear system may have a *unique solution*, *no solution*, or *infinitely many solutions*. Below are graphs of three linear systems of equations

$$\begin{cases} 3x + 5y - z &= -7 \\ x + y + z &= 1 \\ 2x + 11z &= 7 \end{cases} \qquad \begin{cases} 3x + 4y - z &= -7 \\ x - 5y + 2z &= 19 \\ 5x - 6y + 3z &= -31 \end{cases} \qquad \begin{cases} -2x + y + 3z &= -7 \\ x - 4y + 2z &= 0 \\ x - 3y + z &= 1 \end{cases}$$