12/3
- Return Graded Work
- Do this Email
- Collect Lab Work Sheet
- A1. or 4.1

4.1. System of Linear Equations in Two Variables

Method 1: Graphical

\[ x + y = -6 \]
\[ y = 0 \]
\[ x = -6 \]

(6, 0) (0, -6)

\[ x - y = 4 \]
\[ x = 0 \]
\[ 2x = 0 \]

(x, 2) (0, -1)
- Return Graded Work
- Do this Email
- Collect Lab Work Sheet
- A 1. or 4.1

4. A System of Linear Equations in Two Variables

Method 1: Graphical

\[\begin{align*}
 x + 1 &= -6 \\
n &\quad x = -7 \\
x + 6 &= 1 - 6 \\
(6, -6) &\quad (0, 6) \\
(6, a) &\quad (0, b) \\
(6, c) &\quad (0, d)
\end{align*}\]


Graphical Method

Graphical Method Check

\[ x + 1 = y \]
\[ -4 \cdot (\frac{x}{2}) = -4 \]
\[ -y \cdot 2 = -6 \]
\[ -6 = -6 \] \(\checkmark\)

\[ x - 4 \cdot (-2) = y \]
\[ -4 \cdot (-6) = y \]
\[ -4 + 8 = y \]
\[ 4 = y \] \(\checkmark\)

Method 2: Substitution

- Choose an equation
- Solve for a variable
- Replace in 2nd equation
- Solve
- Use 2nd equation’s result for the first

Equation

\[ y \left( \frac{\frac{4}{y} + 4}{y} \right) = \left( -\frac{19}{4} \right) \]

\[ x + 4y = -19 \]
\[ -2x + 14y = -116 \]
\[ \begin{cases} x + 4y = -19 \\ x = 28 - 4y \end{cases} \]
\[ \begin{cases} 28y + 4y = -116 \\ 8y + 38 + 14y = -116 \end{cases} \]
\[ \begin{cases} x + 4(-7) = -19 \\ x = -28 = 19 \end{cases} \]
\[ x = q \]
\[ 22y = -138 \]
\[ y = -15 \]
\[ y = -7 \]
Method 3: Elimination

\[
\begin{align*}
E_1 & \quad \left(\frac{5}{6}x + \frac{4}{3}y = 7\right) \times 6 \quad \Rightarrow \quad \left(5x + 4y = 42\right) \\
E_2 & \quad \left(\frac{7}{12}x - \frac{5}{2}y = 7\right) \times 12 \quad \Rightarrow \quad \left(7x - 10y = -24\right)
\end{align*}
\]

\[
\begin{align*}
\text{LCM of} \ 6, \ 12 & = 324 \\
\frac{78x + 101y}{13} & = 324 \\
78x + 101y & = 324 \\
x & = \frac{54}{13}
\end{align*}
\]

Solve for \(y\):

\[
\begin{align*}
270 + 52y & = 546 \\
52y & = 276 \\
y & = \frac{276}{52} \\
y & = \frac{69}{13}
\end{align*}
\]

\[
\left(\frac{54}{13}, \frac{69}{13}\right)
\]

**TIPS:** *Clear fractions and reduce coefficients to equal 1 for easier substitution.

**Special Cases:**
- One Solution
- No Solution
- All Solutions
\[ E_1: \quad \frac{1}{3}(\frac{8}{7}x - \frac{16}{7}y - \frac{24}{7}) \rightarrow \quad 8x - 16y = 24 \]

\[ \square-8x + 16y = 24 \quad \frac{1-8x + 16y = 24}{16y = 24} \]

\[ y = \frac{3}{2} \quad \text{Not true} \]
\[ \text{no solution} \]

\[ E_2: \quad 6x + y = 1 \rightarrow \quad y = 1 - 6x \]

\[ 3y = 3(1 - 6x) \rightarrow \quad 3(1 - 6x) = 3 - 18x \]

\[ 3 - 18x = 3 - 18x \quad \text{infinite solutions} \]