Chapter 4.1  Solving Linear Eq'ns by Graphing

A system of 2 linear equations -

A solution to a system of equations -

Example: Decide whether the ordered pair (4, -1) is a solution of the system
5x + 6y = 14
2x + 5y = 3

Element of the solution set

Solutions
1. 2. 3.

Types of solutions
1. Consistent system of equations
2. Inconsistent system of equations

Types of solutions
1. Independent Equations
   a. b.
2. Dependent Equations
   a. b.
Solutions Summary

A
B
C

Methods of solution

1. Graphing
2.
3.

Graphing

Goal

A
B
C

Graphing Method

1.
2.
3.

5x - 3y = 9
x + 2y = 7

3x + 5y = 20
2x - 5y = 5
Graphing Method Pros & Cons

Pros

Cons

1. \(2x + 3y = 6\)
   \(-4y = -8\)

2. \(3x - 6y = -18\)
   \(x - 2y = 6\)

3. \(4x - 3y = 6\)
   \(-8x + 6y = -12\)

Ch 4.2 Solving Linear Equations by Substitution

Substitution Method

Substitution Property of Equality

1

2
Substitution Method

1. 2x + 7y = -12
2. x = -2y

Pros & Cons

Cons

1. \( \frac{1}{2}x + \frac{1}{3}y = -\frac{1}{3} \)
2. \( \frac{1}{2}x + 2y = -7 \)
3. 2x + 7y = -12
4. x = 3 - 2y
5. x + 1 = -4y
6. 2x - 5y = 11

Conditional Solutions
Identities

\[
\begin{align*}
\text{Eq. 1:} & \quad -x - 3y = 7 \\
\text{Eq. 2:} & \quad 4x + 12y = -28
\end{align*}
\]

Contradiction

\[
\begin{align*}
\text{Eq. 1:} & \quad y = 8x + 4 \\
\text{Eq. 2:} & \quad 16x - 2y = 8
\end{align*}
\]

Ch 4.3 Solving Linear Equations by Elimination

Elimination Method

\[
\begin{align*}
\text{Step 1:} & \quad \text{No} \\
\text{Step 2:} & \quad \text{Yes}
\end{align*}
\]

Summary
Elimination Method

1. \( x + 2 = -3y \)
2. \( 2x = y + 10 \)

Eg

\[ \frac{x + 3}{5} - \frac{y - 1}{2} = \frac{9}{5} \]
\[ \frac{x - 2}{3} + \frac{y - 2}{5} = \frac{2}{15} \]

Eg

\[ 4x - 5y = -18 \]
\[ 3x + 2y = -2 \]

Pros

Cons

Note

Eg

\[ 0.3x - 0.7y = 2.93 \]
\[ 0.6x - 0.02y = 0.58 \]
Solving Applied Problems

Supply
Demand
Equilibrium

Supply and demand.

The weekly supply and demand equations for packages of computer disks manufactured by Software Supplies, Inc., are
Supply: \(-5p + q = -71\)
Demand: \(-2q + p = 34\)
Where \(p\) is the price in dollars per package and \(q\) is the quantity in thousands of packages to be supplied. Determine the equilibrium price and the number of packages that will sell at that price.

Solving a problem about two unknown numbers.

The two top-selling Disney videos in a recent year were Toy Story and Pocahontas. Together they sold 38 million copies. Pocahontas sold 4 million fewer copies than Toy Story. How many copies of each title were sold?
Solving a problem about quantities and costs.

The average movie ticket (to the nearest US dollar) costs $10 in Geneva and $8 in Paris. If a group of 36 people from these two cities paid $298 for tickets to see The Rookie, how many people from each city were there?

Solving a mixture problem involving percent.

How many liters of 25% alcohol solution must be mixed with 12% solution to get 13L of 15% solution?

Solving a problem about distance, rate and time.

In one hour Ann can row 2 mi against the current or 10 mi with the current. Find the speed of the current and Ann's speed in still water.
Graphing an Inequality

1.

2.

\( 4x + 3y < 9 \)

Multiple Inequalities

- Union

Intersection

\( \text{Graph } 4x + 3y < 9 \text{ and } 3x - 4y \geq 8 \)

Systems of Inequalities

\( \text{Solve the system: } 3x + 3y \geq -6 \)

\[ \begin{align*}
    x & \leq 3 \\
    y & \leq 1
\end{align*} \]