

7c - Solve systems of equations by elimination.

Eliminate one variable using opposites.

$$\begin{array}{r} 4x \\ + \\ \hline -4x \\ \hline 0 \end{array}$$

$$-3y$$

$$\begin{array}{r} 3y \\ \hline 0 \end{array}$$

Equations must be in standard form!

$Ax + By = C$ where a, b, c are integers

Example: $3x + 2y = 5$

$$x - y = 1$$

$$x + y = 3$$

$$\frac{2x = 4}{2} \quad \frac{4}{2}$$

$$x = 2$$

$$x + y = 3$$

$$\begin{array}{r} 2 + y = 3 \\ -2 \quad -2 \end{array}$$

$$y = 1$$

Solu: (2, 1)

intersecting lines.

Check:

$$x - y = 1$$

$$2 - 1 = 1$$

$$1 = 1 \checkmark$$

$$x + y = 3$$

$$2 + 1 = 3$$

$$3 = 3 \checkmark$$

$$2x + 3y = 8$$

$$y = 2x - 6$$

$$\begin{array}{r} -2x \quad -2x \\ -2x + y = -6 \end{array}$$

$$\begin{array}{r} 2x + 3y = 8 \\ -2x + y = -6 \\ \hline 4y = 2 \\ \frac{4y}{4} = \frac{2}{4} \\ \boxed{y = \frac{1}{2}} \end{array}$$

Solu: $(\frac{13}{4}, \frac{1}{2})$
intersecting

$$\begin{array}{r} 2x + 3y = 8 \\ 2x + 3(\frac{1}{2}) = 8 \\ 2x + \frac{3}{2} = 8 \\ \quad -\frac{3}{2} \quad -\frac{3}{2} \\ \hline 2x = 6\frac{1}{2} \text{ or } \frac{13}{2} \\ \frac{2x}{2} = \frac{13}{2} \\ \boxed{x = \frac{13}{4}} \end{array}$$

$$3e + 4f = 19$$

$$3e + 6f = 33$$

If there are no opposites, we have to multiply each term in one equation to make opposites.

$$3e + 4f = 19$$

$$3e + 6f = 33$$

$$\begin{array}{r} -3e - 4f = -19 \\ 3e + 6f = 33 \\ \hline 2f = 14 \\ \hline \boxed{f = 7} \end{array}$$

$$\begin{array}{r} 3e + 4f = 19 \\ 3e + 4(7) = 19 \\ 3e + 28 = 19 \\ \quad -28 \quad -28 \\ \hline 3e = -9 \\ \frac{3e}{3} = \frac{-9}{3} \\ \boxed{e = -3} \end{array}$$

Solu: $(-3, 7)$
intersecting lines

$$5(x - y) = (-8)5$$

$$7x + 5y = 16$$

$$\begin{array}{r} 5x - 5y = 40 \\ 7x + 5y = 16 \\ \hline 12x = -24 \\ \frac{12}{12} \quad \frac{12}{12} \\ \boxed{x = -2} \end{array}$$

$$\begin{array}{r} x - y = -8 \\ -2 - y = -8 \\ +2 \quad \quad +2 \\ \hline -y = -6 \\ \frac{-y}{-1} = \frac{-6}{-1} \\ \boxed{y = 6} \end{array}$$

Solu: $(-2, 6)$
intersecting

$$-2(2x-8y)=(16) \cdot 2$$

$$4x-16y=-6$$

$$\begin{array}{r} -4x+16y=-32 \\ 4x-16y=-6 \\ \hline \end{array}$$

$$0 = -38$$

no solu.
parallel lines.

$$4(2x+5y=14) \rightarrow 8x+20y=56$$

$$5(5x-4y=2) \rightarrow 25x-20y=10$$

$$\begin{array}{r} 8x+20y=56 \\ 25x-20y=10 \\ \hline 33x=66 \\ \frac{33}{33} \quad \frac{66}{33} \end{array}$$

$$\boxed{x=2}$$

Solu: (2,2)
intersecting

$$2x+5y=14$$

$$2(2)+5y=14$$

$$\begin{array}{r} 4+5y=14 \\ -4 \quad \quad -4 \\ \hline 5y=10 \\ \frac{5}{5} \quad \frac{10}{5} \end{array}$$

$$\boxed{y=2}$$

$$5(5x - 3y) = (6)5 \rightarrow 25x - 15y = 30$$

$$3(2x + 5y) = (-10)3 \rightarrow 6x + 15y = -30$$

$$\begin{array}{r} 31x = 0 \\ \hline 31 \quad 31 \end{array}$$

$$\boxed{x = 0}$$

$$\text{Solu: } (0, -2)$$

intersecting.

$$5x - 3y = 6$$

$$5(0) - 3y = 6$$

$$0 - 3y = 6$$

$$\begin{array}{r} -3y = 6 \\ \hline -3 \quad -3 \end{array}$$

$$\boxed{y = -2}$$

HW: worksheet

