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System of linear equations (2 * 2)

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$$\begin{cases} 3x - 5y = -7 \\ x - 4y = -7 \end{cases}$$

two equations
two unknown variables

a) (1, 2) } are these coordinates a solution to the system
b) (-2/3, 1) }

* to be a sol'n, must satisfy all equations in the system

a) $3(1) - 5(2) = 3 - 10 = -7$ ✓ yes
 $(1) - 4(2) = 1 - 8 = -7$ ✓

b) $3(-\frac{2}{3}) - 5(1) = -2 - 5 = -7$ ✓ No
 $-\frac{2}{3} - 4(1) = -\frac{2}{3} - \frac{12}{3} = -\frac{14}{3} \neq -7$ X

15) $x + 3y = 5$ Solve using substitution method.

$$\begin{cases} x + 3y = 5 \\ 3x - 2y = -18 \end{cases}$$

$x + 3y = 5$
 $x = 5 - 3y$ → $3(5 - 3y) - 2y = -18$
 $15 - 9y - 2y = -18$
 $-11y = -18 - 15$
 $-11y = -33$
 $y = 3$

* Plug y into first equation

$x = 5 - 3y$
 $x = 5 - 3(3)$
 $x = 5 - 9$
 $x = -4$

Answer:
 $(-4, 3)$

* Plug x into 2nd equation

Solve System
 using Sub.

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20) $5(x+y) = 9 + 2y$

$6y - 2 = 10 - 7x$

$5x + 5y - 2y = 9$

$5x + 3y = 9$

$3y = 9 - 5x$

$y = 3 - \frac{5}{3}x$

$y = 3 - \frac{5}{3}(2)$

$y = \frac{9}{3} - \frac{10}{3}$

$y = -\frac{1}{3}$

$7x + 6y = 12$

$7x + 6(3 - \frac{5}{3}x) = 12$

$7x + 18 - \frac{30}{3}x = 12$

$7x - 10x = 12 - 18$

$-3x = -6$

$x = 2$

Answer:
 $(2, -\frac{1}{3})$

Plug coordinate into your original system to double check your answer.

Elimination by addition method

22) $5x - 2y = -2$

$3x + 4y = 30$

want to add one equation to another and eliminate one of your variables

$2(5x - 2y) = 2(-2)$

$+ 3x + 4y = 30$

$10x - 4y = -4$

$+ 3x + 4y = 30$

$13x = 26$

$x = 2$

Plug $x = 2$ into the equation you did not change (we doubled first, so plug into 2nd).

$3(2) + 4y = 30$

$4y = 24$

$y = 6$

Answer:
 $(2, 6)$

$$28) \begin{cases} 3x - 4y = 9 \\ 2x + 9y = 2 \end{cases}$$

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$$\begin{aligned} 2(3x - 4y) &= 2(9) \\ -3(2x + 9y) &= 3(2) \end{aligned}$$

$$\begin{aligned} &\Rightarrow \begin{array}{r} 6x - 8y = 18 \\ -6x - 27y = -6 \\ \hline -35y = 12 \\ y = \frac{-12}{35} \end{array} \end{aligned}$$

$$3x - 4\left(\frac{-12}{35}\right) = 9$$

$$3x + \frac{48}{35} = 9$$

$$\frac{105x}{35} + \frac{48}{35} = \frac{315}{35}$$

$$105x + 48 = 315$$

$$105x = 267$$

$$x = \frac{267}{105}$$

$$= \frac{89}{35}$$

$$\begin{array}{r} \times 89 \\ \sqrt{267} \\ 24 \\ \hline 27 \\ 0 \end{array}$$

Answers

$$\left(\frac{89}{35}, \frac{-12}{35} \right)$$

Yuck!

$$\frac{x+1}{2} - \frac{y-2}{10} = -1$$

$$\frac{x+1}{6} + \frac{y-2}{2} = 21$$

$$\Rightarrow \frac{5x+5}{10} - \frac{y-2}{10} = \frac{-10}{10}$$

$$\frac{x+1}{6} + \frac{3y-6}{6} = \frac{126}{6}$$

$$\begin{aligned} 5x+5 - (y-2) &= -10 \\ \Rightarrow x+1 + (3y-6) &= 126 \end{aligned}$$

$$\Rightarrow 5x+5 - y+2 = -10$$

$$x+1 + 3y-6 = 126$$

$$\begin{cases} 5x - y = -17 \\ x + 3y = 131 \end{cases}$$



#3 from handout

○ $5m + 2v = 16$
 $3m + 8v = 47$, find m and v .

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$-4(5m + 2v) = -4(16)$

$-20m - 8v = -64$

$-20m - 8v = -64$
 $+ 3m + 8v = 47$

$-17m = -17$

$m = 1$

○ $3(1) + 8v = 47$

$8v = 44$

$v = \frac{11}{2}$ or 5.50