§4.1 Solving Systems of Linear Equations in two variables

Solution
Consistent
Inconsistent
Independent
Dependent

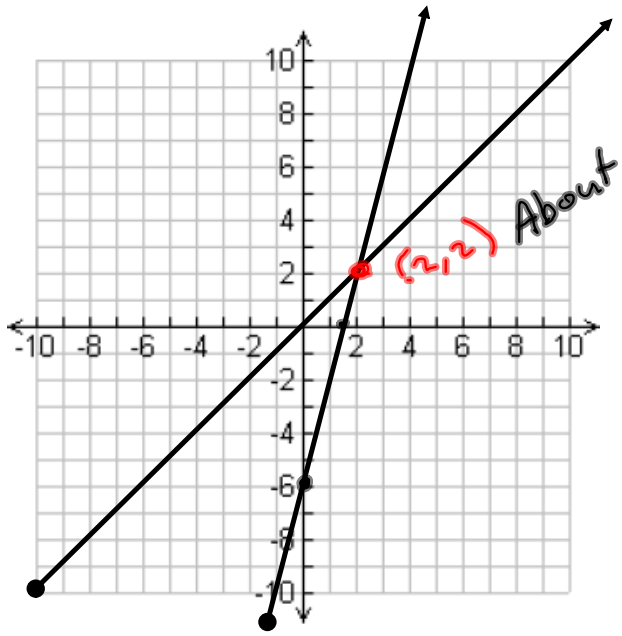
A solution is an ordered pair (x,y) that satisfies both equations.

Is $(3,5)$ a soln of

$$2x-3y=-9$$
$$4x+2y=-2$$

$2(3)-3(5)=-9$? Yes
$6-15=-9$ ✓

$4(3)+2(5)=-2$?
$12+10=-2$ NO



(2,2) About

$4x-y=6$
$x-y=0$

Recipe for solving systems by substitution.
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$4x-y=6$
$x-y=0$
$\rightarrow x=y$

$4x-y=6$
$4y-y=6$
$3y=6$

$y=\frac{6}{3}=2=y$
$\rightarrow x-y=0$
$x-2=0$
$x=2$

Check
$4x-y=6$
$4(2)-2=6$?
$8-2=6$ ✓

$(x,y)=(2,2)$
Solution Set
$(x,y)\in\{(2,2)\}$

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$3\left(\frac{x}{3} + y = \frac{4}{3}\right) \Rightarrow x + 3y = 4$

$-x + 2y = 11$

$-x + 2y = 11$

Isolate x in one equation. Send it to the other.

$x = -3y + 4$

$-x + 2y = 11$

$-(-3y+4) + 2y = 11$

$3y - 4 + 2y = 11$

$5y - 4 = 11$

$5y = 15$

$\boxed{y = 3}$

$x = -3y + 4$

$x = -3(3) + 4$

$x = -9 + 4$

$\boxed{x = -5}$

Scratch

$3 \cdot \frac{x}{3} + 3y = 3 \cdot \frac{4}{3}$

$\frac{3}{1} \cdot \frac{x}{3} + 3y = \frac{3}{1} \cdot \frac{4}{3}$

$x + 3y = 4$

Check: $(x,y) = (-5, 3)$

$-x + 2y = 11$

$-(-5) + 2(3) = 11$?

$5 + 6 = 11$ ✓

$\boxed{(x,y) = (-5, 3)}$

Better Style:

$(x,y) \in \{(-5,3)\}$

$\frac{1}{3}x = \frac{x}{3}$

$\frac{1}{3x}$ WRONGGH

$1/3\,x = \frac{1}{3}x$ OR $\frac{1}{3x}$? I don't know.

$(1/3)\,x$

Elimination Method.

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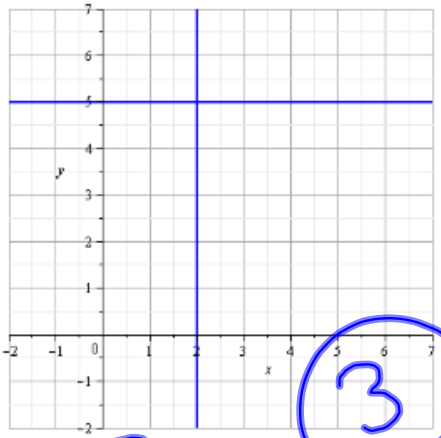
$$\begin{array}{r} A = B \\ C = D \\ \hline A + C = B + D \end{array}$$

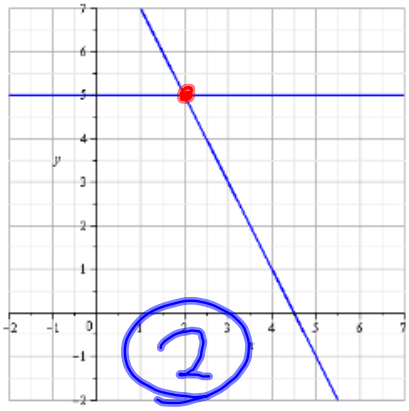
If you replace an equation by the sum of two equations, the new system is equivalent. → Same Solution to the 1st



x = 2
y = 5

2x = 4
y = 5

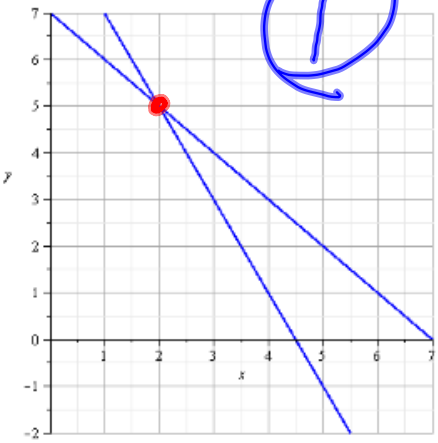
3



2x + y = 9
y = 5

2

Subtract 1st from 2nd. Replace 2nd equation with the result.



1

2x + y = 9
2x + 2y = 14

Solve by elimination

$$-x + 2y = 0$$
$$x + 2y = 5$$

$$4y = 5$$

$$y = \frac{5}{4}$$

$$-x + 2y = 0$$
$$-x + 2\left(\frac{5}{4}\right) = 0$$
$$-x + \frac{5}{2} = 0$$
$$-x = -\frac{5}{2}$$
$$x = \frac{5}{2}$$

$$(x, y) \in \left\{\left(\frac{5}{2}, \frac{5}{4}\right)\right\}$$

ONE SOLUTION

Unique Solution

Independent System

Dependent Systems

Consistent

$-3(3x+2y=7)$

$9x+6y=21$

$-9x-6y=-21$

$9x+6y=21$

$0=0$

Inconsistent

$-3(3x+2y=7)$

$9x+6y=4170$

$-9x-6y=-21$

$9x+6y=4170$

$0=4149$

FALSE

Parallel Lines

S 4.1 I #s 2, 5, 16, 20, 24, 28*, 35 tomorrow

S 4.1 II #s 32, 34, 47, 48 wednesday.

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