L2 (1.4) Solving Linear Systems by Substitution

Given y = 2x + 3, what does it mean if:

(a) x = -1 (b) y = 7 (c) y = x - 1

solve graphically

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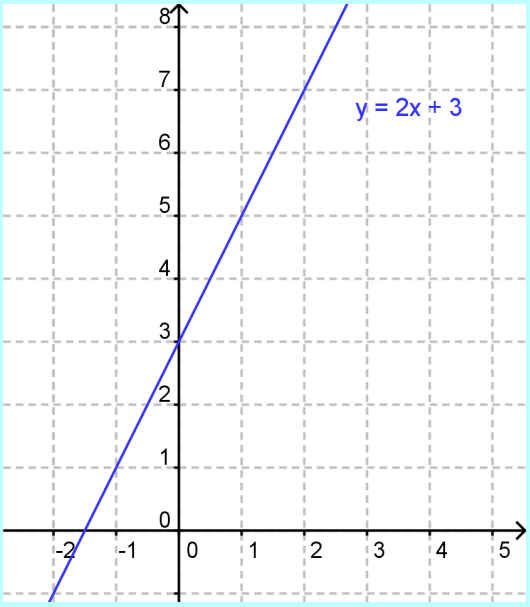

solve graphically

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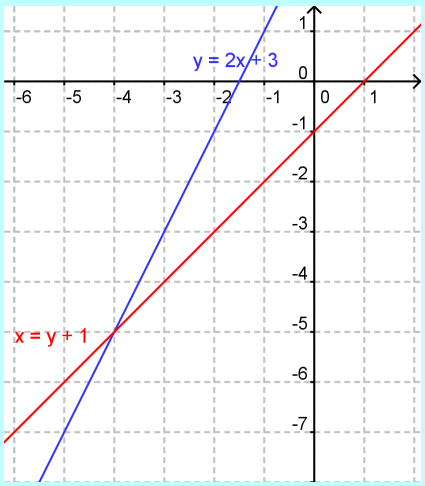

solve graphically

Solving Linear Systems by Substitution

Feb 10/ 2016

Graphically, the solution to a system of linear equations is the point(s) where the lines intersect.

desmos

Algebraically, we can:

1. isolate one variable in one equation.
2. substitute the isolated variable into the other equation.
3. solve for the single variable.
4. sub the answer from step 3 into the isolated equation from step 1 to find the other variable.

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Ex.1. Solve y = 3x - 2 and x = y - 2

Sub the x-value from the second equation into the first equation

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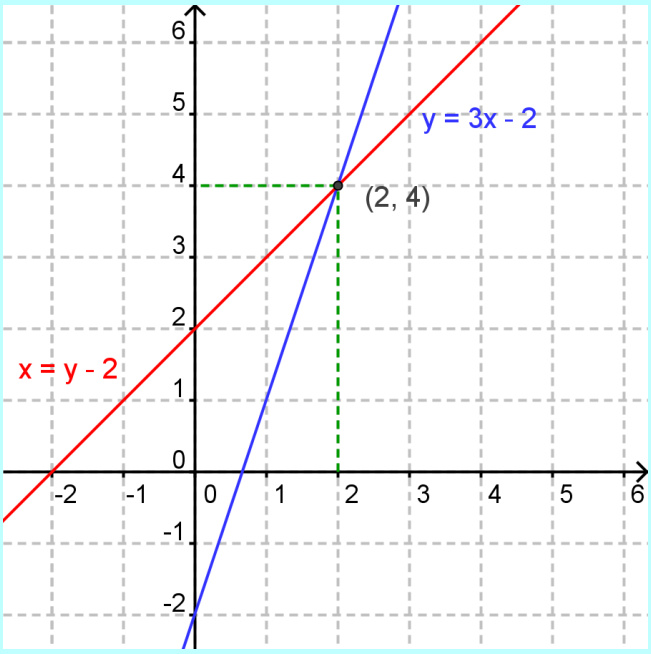

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Ex.1. Solve y = 3x - 2 and x = y - 2.
The solution is (2, 4), or x = 2 and y = 4.

To perform a formal check of the solution, sub these values into each equation and compare sides.

y = 3x - 2	x = y - 2

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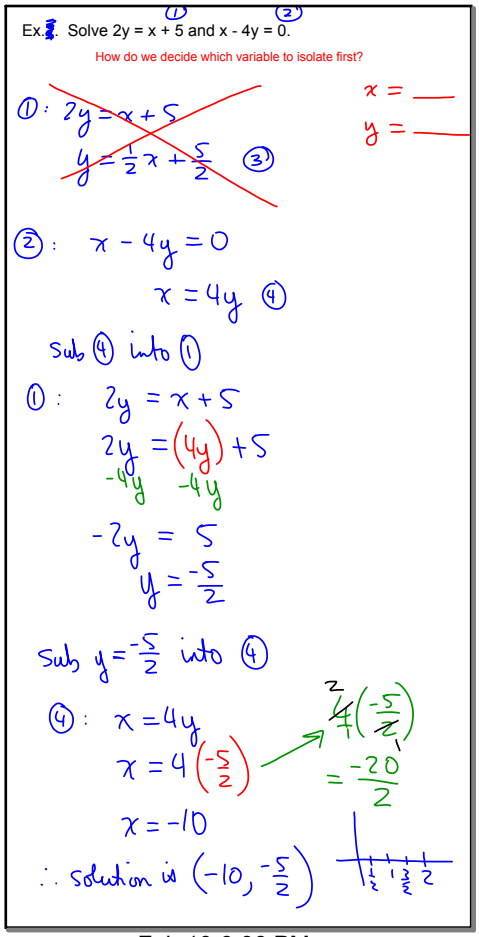

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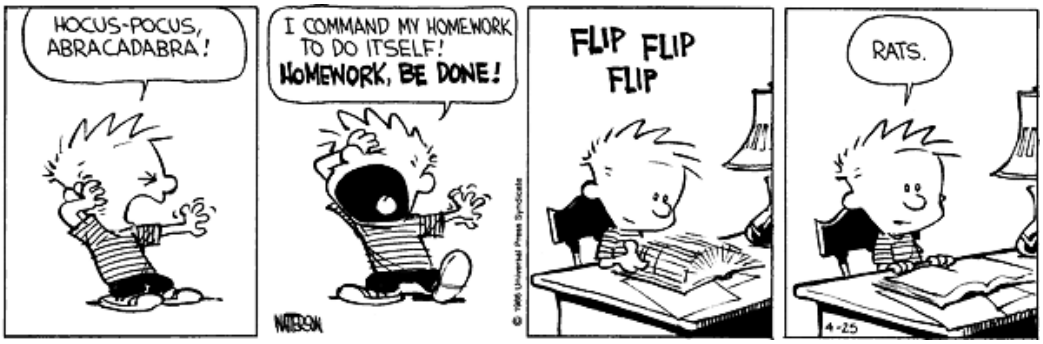
Assigned Work:

p. 39-40 # 3, 4bf, 5be, 9bcef



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3 ab.

(a) $1x+3y=5$ ① $2x-3y=-17$ ②

$x =$ ____ $y =$ ____

①: $x=-3y+5$ ③

sub ③ into ②

②: $2(-3y+5)-3y=-17$

$-6y+10-3y=-17$

$-9y+10=-17$

$-10 \quad -10$

$\frac{-9y}{-9} = \frac{-27}{-9}$

$y=3$

sub $y=3$ into ③

③: $x=-3(3)+5$

$x=-9+5$

$x=-4$

$\therefore (-4,3)$ is a solution.

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3(b) $2x + y = 4$ ① $3x - 16y = 6$ ②

① for x

$\frac{2x}{2} = \frac{-y}{2} + \frac{4}{2}$

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

① for y

$y = -2x + 4$

Use this!

② for x

$\frac{3x}{3} = \frac{16y}{3} + \frac{6}{3}$

$x = \frac{16}{3}y + 2$

② for y

$\frac{-16y}{-16} = \frac{-3x}{-16} + \frac{6}{-16}$

$y = \frac{3}{16}x - \frac{3}{8}$

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4(b) $6r + 3s = 9$, r

$\frac{6r}{6} = \frac{-3s}{6} + \frac{9}{6}$

$r = \frac{-1}{2}s + \frac{3}{2}$

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5(e) $2x+y=5$ ① $x-3y=13$ ②

①: $y=-2x+5$ ③

sub ③ into ②

$x-3(-2x+5)=13$

$x+6x-15=13$

$7x-15=13$

$\frac{7x}{7}=\frac{28}{7}$

$x=4$

sub $x=4$ into ③

$y=-2(4)+5$

$y=-8+5$

$y=-3$ ∴ solution is $(4,-3)$

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9 cf

(c) $7m+2n=21$ ① $\frac{10m}{2}+\frac{4n}{2}=\frac{-10}{2}$ ②

$5m+2n=-5$

$\frac{2n}{2}=\frac{-5m}{2}-\frac{5}{2}$

$n=-\frac{5}{2}m-\frac{5}{2}$ ③

sub ③ into ①

$7m+2\left(-\frac{5}{2}m-\frac{5}{2}\right)=21$

$7m-5m-5=21$

$\frac{2m}{2}=\frac{26}{2}$

$m=13$

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9(f) $\frac{1}{4}x - 3y = \frac{1}{2}$ ① $\frac{1}{3}x - 9y = 5$ ②

①×4: $x - 12y = 2$ ③

②×3: $x - 27y = 15$ ④

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Attachments

Basic 2D Grid.agg