L2 Solving a System with Substitution.notebook

Lesson 2 Solving a System with Substitution

Substitution Method
1. Isolate one of the variables in one of the equations.
2. Substitute this expression into the other equation in order to solve for the other variable.
3. Substitute this value into either equation to solve for the second variable.
4. Check the solution in each of the original equations. (optional)

Example 1
Solve, algebraically.

① $3x + 4y = 15$

② $x - y = 5$ ⟶ isolate x in ②

$x = y + 5$

sub into ①

$3x + 4y = 15$

Now only one ⟶ $3(y + 5) + 4y = 15$
variable

$3y + 15 + 4y = 15$

solve for y

$7y = 0$

$y = 0$

sub y = 0 into ②

$x - y = 5$

$x - 0 = 5$

$x = 5$

(can sub into either original eqn)

sol'n

$(5, 0)$

* can check by subbing into both original eqns

Example 2
Solve, algebraically.

① $x + y = 8$

② $x - 3y = 4$

isolate x in ②

$x = 3y + 4$

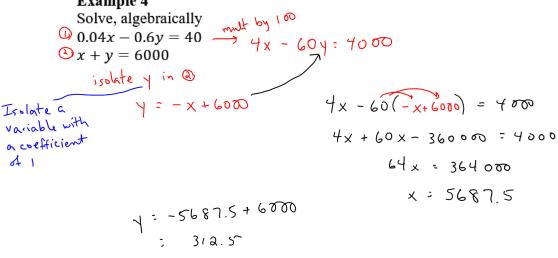sub into ①

$x + y = 8$

$3y + 4 + y = 8$

$4y = 4$

$y = 1$

Sub y = 1 into ①

$x + y = 8$

$x + 1 = 8$

$x = 7$

sol'n

$(7, 1)$

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Example 3

2 Solve, algebraically.

$\frac{x}{3} + \frac{y}{6} = \frac{1}{2}$ multiply by 6 to get rid of fractions

$3x + 2y = 4$

$2x + y = 3$

isolate y

$y = -2x + 3$

sub into ②

$3x + 2y = 4$

$3x + 2(-2x + 3) = 4$

$3x - 4x + 6 = 4$

$-x = -2$

$\boxed{x = 2}$

sub $x = 2$ into ②

$3x + 2y = 4$

$3(2) + 2y = 4$

$2y = -2$

$\boxed{y = -1}$

sol'n $(2, -1)$

Example 4

Solve, algebraically

① $0.04x - 0.6y = 40$ mult by 100 → $4x - 60y = 4000$

② $x + y = 6000$

isolate y in ②

Isolate a variable with a coefficient of 1

$y = -x + 6000$

$4x - 60(-x + 6000) = 4000$

$4x + 60x - 360000 = 4000$

$64x = 364000$

$x = 5687.5$

$y = -5687.5 + 6000$

$\quad = 312.5$

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Example 5
Solve, algebraically.

already → $y = 3x - 4$
isolated $6x - 2y = 8$

$6x - 2(3x - 4) = 8$

$\cancel{6x} - \cancel{6x} + 8 = 8$ ✓

or

$0 = 0$ ✓

∴ sol'n
an infinite # of sol'ns along the
line $y = 3x - 4$
(dependent system)

Example 6
Solve, algebraically.
$y = 2x - 4$
$2x - y + 1 = 0$

$2x - (2x - 4) + 1 \neq 0$

$\cancel{2x} \cancel{-2x} + 4 + 1 \neq 0$

$5 \neq 0$

no sol'n
(inconsistent system)

pg. 300
#1 a, c, e, g, j, m, p
2 a
3 a
4 a

Try 5 a

3