Your Name

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Notes

Lesson 1.4

Solving Systems of Two Equations by Elimination

The ELIMINATOR!!!!!

Gettin rid of variables left and right

Finding the solution using Elimination

*Use when one variable has the same coefficients in both equations but one is added and one is subtracted (alphabetical order on same side)

Step 1: Put both equations in standard form $Ax+By=C$

Step 2: Add the equations together (x's with x's and y's with y's and constants with constants) (eliminates one of the variables)

Step 3: Solve for the variable that is left

Step 4: Substitute the solved variable in to one of the original equations to solve for the other.

ex. $x + y = -4$
$+ (x - y = 2)$ (eliminated/canceled out) step 1
$2x + 0y = -2$ step 2
$\frac{2x}{2} = \frac{-2}{2}$ step 3
$x = -1$

$x + y = -4$ step 4
$(-1) + y = -4$
$+1 \quad +1$
$y = -3$
$(-1, -3)$

ex. $2m - 3n = 14$
$+ (m + 3n = -11)$
$\frac{3m}{3} = \frac{3}{3}$
$m = 1$

$m + 3n = -11$
$(1) + 3n = -11$
$-1 \quad -1$
$\frac{3n}{3} = \frac{-12}{3}$
$n = -4$
$(1, -4)$
(m, n)
alphabetical order

$-3x - 4y = -1$
$3x = -4 + y$
$-y \quad -y$ step 1
$3x - y = -4$
$+ (-3x - 4y = -1)$
$-5y = -5$ step 2
$\frac{-5y}{-5} = \frac{-5}{-5}$ step 3
$y = 1$

$3x = -4 + (1)$ step 4
$\frac{3x}{3} = \frac{-3}{3}$
$x = -1$
$(-1, 1)$
(x, y)

$3c + d = 4$
$2c - d = 6$

$-0.2x + y = 0.5$
$+ (0.2x + 2y = 1.6)$
$\frac{3y}{3} = \frac{2.1}{3}$
$y = .7$

$0.2x + 2(.7) = 1.6$
$0.2x + 1.4 = 1.6$
$-1.4 \quad -1.4$
$\frac{0.2x}{0.2} = \frac{0.2}{0.2}$
$x = 1$
$(1, 0.7)$

10. $3x - 2y = -2$

$y = -3x - 8$

$+3x \quad +3x$

$3x + y = -8$

$-2y = -3x - 2$

$-2 \quad -2$

$y = \frac{3}{2}x + 1 = -3x - 8$

$3x + 2 = -6x - 16$

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

$3x + 6x + 16 = -2$

$9x + 16 = -2$

$-16 \quad -16$

$\frac{9x}{9} = \frac{-18}{9}$

$x = -2$

$y = -3(-2) - 8$

$y = 6 - 8$

$y = -2$

$(-2, -2)$

(x, y)

Coefficents the same and same sign

$3x - y = -4$

$+y \quad +y$

$3x = y - 4$

$+4 \quad +4$

$y = 3x + 4$

Sometimes when you add the equations no terms get eliminated. When this happens

multiply one of the equations by -1 so that ALL the signs change, and now when you add the equations a variable will cancel.

$3x - 4y = -1$

$-1(3x - y = (-4)(-1))$

$-3x + y = 4$

$3x - 4y = -1$

$-3y = 3$

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

$y = -1$

$3x - (-1) = -4$

$3x + 1 = -4$

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

$x = -\frac{5}{3} = -1\frac{2}{3}, -1.67$

$(-\frac{5}{3}, -1)$

$-3x + y = 4$

$+3x \quad +3x$

$y = 3x + 4$

Same line even though we multiplied by -1

Using Elimination when Mutliplication is needed

*Use when every variable has coefficients and none match or fractions/decimals

Step 1: Put both equations in standard form

Step 2: Multiply both entire sides by a number that will make one of the variables eliminated when added.

Step 3: Add the equations together (x's with x's and y's with y's and constants with constants)

Step 4: Solve for the variable that is left

Step 5: Substitute the solved variable in to one of the original equations to solve for the other.

ex. $2x + 3y = 6$

$-2(x + 2y = 5)$ ✓ step 1 ✓

$-2x - 4y = -10$ step 2

$+\ 2x + 3y = 6$ step 3

$\frac{-1y}{-1} = \frac{-4}{-1}$ step 4

$y = 4$

$x + 2(4) = 5$ step 5

$x + 8 = 5$

$x = -3$

$(-3, 4)$

ex. $3a - b = 2$

$a + 2b = 3$

Multiples:
4: 4, 8, 12, 16...
2: 2, 4, 6, 8, 10, 12

LCM(4,2) = 4 ★ Variables on same side? Alphabetical order?

$4c - 6d = 22$ ✓

$+2(2c - 3d = 10)$ ✓

$-4c + 6d = -20$

$+\ 4c - 6d = 22$

$0c + 0d = 2$

$0 = 2$

False

No Solution

These lines are Parallel

★ $x = 2y + 6$

$-2(.5x - y = 3)$

$2x - 2y = 6$

$+\ -x + 2y = -6$

$0 = 0$

True

Infinitely Many Solutions

Same lines

LCM(4,6) = 12

$3(4x + 5y = 6)$

$-2(6x - 7y = -20)$

$12x + 15y = 18$

$-12x + 14y = 40$

$\frac{29y}{29} = \frac{58}{29}$

$y = 2$

$4x + 5(2) = 6$

$4x + 10 = 6$

$4x = -4$

$x = -1$

$(-1, 2)$