5.4 notes

Friday, October 23, 2020 11:59 AM

Warm up: $2x + 5y - 2y - 3 = 2x + 9$

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

$-2x \quad +3 \quad -2x \quad +3$

$\frac{3y}{3} = \frac{12}{3}$

$y = 4$

Foundations and Precalculus 10

5.4 – Solving Systems of Equations by Elimination

When we solve a linear system by graphing, it is not always possible or convenient to get exact values. We will look at another algebraic method that can be used to find these exact values.

Properties of Linear Systems

1. Multiplying both sides of either equation of a linear system by a constant does not change the solution.
2. Adding or subtracting the equations of a linear system does not change the solution.

Elimination Steps:

1. One of the variables must have the same coefficient (number in front) in both equations; if not, multiply one or both of the equations to create equal coefficients. ; opposite signed
2. Add or subtract the equations to eliminate one of the variables.
3. Solve for the remaining variable.
4. Substitute known value into either original equation.
5. Solve for remaining variable.
6. Check your answer.

y terms eliminate

Example 1:

① $2(15x - 2y = 9) \rightarrow 30x - 4y = 18$

② $5x + 4y = 17 \rightarrow 5x + 4y = 17$

$\frac{35x}{35} = \frac{35}{35}$

$x = 1$

$15(1) - 2y = 9$

$15 - 2y = 9$

$-15 \quad -15$

$\frac{-2y}{-2} = \frac{-6}{-2}$

$y = 3$

(1, 3)

$x = 1$

$y = 3$

check: (1, 3)

① $15x - 2y = 9$

$15(1) - 2(3) = 9$

$15 - 6 = 9$

$9 = 9$ ✓

② $5x + 4y = 17$

$5(1) + 4(3) = 17$

$5 + 12 = 17$

$17 = 17$ ✓

Example 2:

① $7(2x - 5y = 29) \rightarrow 14x - 35y = 203$

$3y = 7x + 0$

$-7x \quad -7x$

② $2(-7x + 3y = 0) \rightarrow -14x + 6y = 0$

$-29y = 203$

$\frac{-29y}{-29} = \frac{203}{-29}$

$y = -7$

$3(-7) = 7x$

$\frac{-21}{7} = \frac{7x}{7}$

$-3 = x$

check (-3, -7)

① $2x - 5y = 29$

$2(-3) - 5(-7) = 29$

$-6 + 35 = 29$

$29 = 29$ ✓

② $3y = 7x$

$3(-7) = 7(-3)$

$-21 = -21$ ✓

Example 3:

① $\frac{2}{3}x - \frac{1}{2}y = 4 \rightarrow 4x - 3y = 24$

②
$\frac{1}{2}x - \frac{5}{2} = -\frac{1}{4}y$

$+\frac{5}{2} \quad +\frac{5}{2}$

$\frac{1}{2}x = -\frac{1}{4}y + \frac{5}{2}$

$+\frac{1}{4}y \quad +\frac{1}{4}y$

$2\left(\frac{1}{2}x + \frac{1}{4}y = \frac{5}{2}\right) \quad -3(2x + y = 10)$

$6x + 3y = 30$

$+\ 4x - 3y = 24$

$\frac{10x}{10} = \frac{54}{10}$ ÷2 ÷2

$x = \frac{27}{5}$

$2\left(\frac{27}{5}\right) + y = 10$

$5\left(\frac{54}{5} + y = 10\right)$

$54 + 5y = 50$

$-54 \quad -54$

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

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

Check $\left(\frac{27}{5}, -\frac{4}{5}\right)$

→ try using your calculator to check

Recall Steps:

① rearrange into same order
② get rid of fractions.
③ create equal but opposite signed coefficients in front of one variable.
④ add equations
⑤ solve for variable.
⑥ sub. value for variable into original equation to find other variable.
⑦ check!
→ manually
→ calculator.

① `(2/3)*(27/5)-(1/2)*(-4/5)` → 4

② `(1/2)*(27/5)-(5/2)` → .2

`(-1/4)*(-4/5)` → .2

HW: p437 #3,6,12ab; challenge yourself: #9