

2 Elimination (8.2)

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PRE-CALCULUS 11 Chapters 8-9 – Day 3: SOLVING SYSTEMS OF EQUATIONS ALGEBRAICALLY (Part 2)

SOLVING SYSTEMS ALGEBRAICALLY

The solution of a system of equations can be solved algebraically:

- with the substitution method, or with the **elimination method**.

NOTE!

SOLVING SYSTEMS OF EQUATIONS WITH THE ELIMINATION METHOD

To solve a system of equations algebraically using The Elimination Method:

1. Write both equation so that like-terms line up.
2. Eliminate one of the variables by adding (subtracting) the equations; all the terms of one of the variables must be eliminated.
 - a. The coefficients of the eliminated terms must have opposite (equal) values.
 - b. It may be necessary to multiply one or both equations to get suitable coefficients.
3. Solve this equation; find the roots - the values of this first variable.
4. Substitute each of these roots into an equation with both variables.
5. Solve these equations; find the value of the second variable.

Example 1: Solve the system of equations $x^2 - y = 5$ and $x - 2y = 4$ using the Elimination Method.

(1) (2)

$$(1) \quad x^2 - y - 5 = 0 \quad \text{M} \textcircled{1} \quad \text{Multiply by } -2$$

$$(2) \quad x - 2y - 4 = 0$$

$$\begin{array}{r} -2x^2 + 2y + 10 = 0 \\ x - 2y - 4 = 0 \\ \hline \end{array} \quad \begin{array}{l} \text{Mult. Eq 1 by } -2 \\ \text{Copied Eq 2} \end{array}$$

$$-2x^2 + x + 6 = 0 \quad \text{M} \textcircled{1} \quad y\text{'s are eliminated}$$

$$(2)x^2 - x - 6 = 0 \quad \text{Solve!}$$

$$\begin{array}{r} -4 \times 3 = -12 \\ -7 + 8 = -1 \\ \hline \end{array} \quad \begin{array}{r} 2x \quad | \quad 2x \\ -4 \quad | \quad 3 \\ \hline -2 \end{array}$$

$$(x-2)(2x+3) = 0$$

$$\boxed{x=2} \quad \text{or} \quad \boxed{x = -\frac{3}{2}}$$

Soln:

$$\left\{ (2, -1), \left(-\frac{3}{2}, -\frac{11}{4}\right) \right\}$$

Plug in
 $x=2$:

$$\begin{array}{l} x - 2y - 4 = 0 \\ 2 - 2y - 4 = 0 \\ -2 = 2y \\ \boxed{y = -1} \end{array}$$

plugin
 $x = -\frac{3}{2}$

$$\begin{array}{l} -\frac{3}{2} - 2y - 4 = 0 \\ -\frac{3}{2} - 2y = 4 \\ -\frac{3}{2} - 2y = 2y \\ -\frac{11}{2} = 2y \\ \boxed{y = -\frac{11}{4}} \end{array}$$

Example 2: Solve using The Elimination Method. Find the exact values.

$2 \cdot 2 = 2^0$
 $y = -\frac{11}{4}$

Example 2: Solve using The Elimination Method. Find the exact values.

$x^2 - 4x - y + 2 = 0$ and
 $3x + 2y - 11 = 0$

$x^2 - 4x - y + 2 = 0$ M2 Line up like terms!
 $3x + 2y - 11 = 0$

$2x^2 - 8x - 2y + 4 = 0$
 $3x + 2y - 11 = 0$

 $2x^2 - 5x - 7 = 0$

$2x^2 = 2x \cdot x$
 $2x^2 - 7 = 2x \cdot x - 7$
 $(x+1)(2x-7) = 0$
 $x = -1$ or $x = \frac{7}{2}$

Plug in to find corr. y's:

$y = 7$ $y = \frac{1}{4}$

$\{ (-1, 7), (\frac{7}{2}, \frac{1}{4}) \}$

Assignment: Sec 8.2, p. 452 #4-7, 18, 23, 24

exercise: Solve using The Elimination Method. Find the exact values.

a) $x^2 - 6y + 6 = 0$ and
 $3x^2 - 18y - 72 = 0$

b) $x^2 - 3y + 6 = 0$ and
 $-2x^2 + 6y - 12 = 0$

c) $2x^2 - 7x - y + 3 = 0$ and
 $-x^2 + 6x - y - 7 = 0$

Solutions: a) Hmm, what do you conclude? B) Hmm, what do you conclude?

c) $\{(1, -2), (\frac{10}{3}, \frac{17}{9})\}$

Do not print

exercise: Solve using The Elimination Method. Find the exact values.

a) $x^2 - 4x - y + 2 = 0$
 $3x + 2y - 11 = 0$

b) $x^2 + 2x - 2y + 6 = 0$
 $2x^2 + 4x - y + 3 = 0$

$x = -1$ and $y = 7$ or $x = \frac{7}{2}$ and $y = \frac{1}{4}$

$x = 0$ and $y = 3$ or $x = -2$ and $y = 3$

c) $x^2 - 2y - 6 = 0$
 $2x^2 - 4y + 3 = 0$

d) $-x^2 + 2y + 6 = 0$
 $2x^2 - 4y - 12 = 0$

no solution

infinitely many solutions

