

Ch. 30 - Board PROBLEMS

SOLVE By ELIMINATION.

$$\textcircled{1} \quad x - y = 11$$

$$2x + y = 19$$

$$\textcircled{2} \quad -4x + 9y = 9$$

$$x - 3y = -6$$

$$\textcircled{3} \quad 5x + 4y = ~~-14~~ -14$$

$$3x + 6y = 6$$

- $\textcircled{4}$ A FATHER IS THREE TIMES AS ~~OLD~~ OLD AS HIS SON. His daughter is 3yrs Younger than his son. The sum of their ages is 3 years ago was 63. What is the age of the father?

Ch. 30 - SOLVING EQUATIONS W/THREE VARIABLES USING ELIMINATION

$$\begin{array}{rcl} \textcircled{1} & 2x + 3y - z & = 11 \\ & 3x - y + 2z & = 4 \\ & 4x + 2y + 3z & = 8 \end{array}$$

ADD $\textcircled{A}$ & $\textcircled{B}$ TO ELIMINATE z .

②

$$3x + 2y + 4z = 9$$

$$4x + 3y - 2z = 6$$

$$5x + 4y - 3z = 8$$

SOLVING 3 EQ W/MATRICES ON CALCULATOR!

5

(2nd) MATRIX

Arrow over to $[3 \times 4]$ ENTER
EDIT

ENTER COEFFICIENTS OF 3 ~~VAR~~ EQS.

$$2x + 3y - z = 11$$

$$3x - y + 2z = 4$$

$$4x + 2y + 3z = 8$$

coefficients go here.

$$\begin{bmatrix} 2 & 3 & -1 & 11 \\ 3 & -1 & 2 & 4 \\ 4 & 2 & 3 & 8 \end{bmatrix}$$

(2nd) QUIT

(2nd) MATRIX → MATH

↓ rref (enter

(2nd) MATRIX (A) ENTER)

RREF MEANS
Reduce
Row
Eschelon
Form

$$\begin{bmatrix} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{bmatrix}$$

$$x = 3$$

$$y = 1$$

$$z = -2$$

enter

Practice Problems Find the solution that will satisfy all three equations.

1) A) $X + 2Y - Z = 2$
B) $2X - Y + 3Z = -1$
C) $-2X + 3Y - 4Z = 1$

2) A) $X - 2Y + 4Z = -4$
B) $3X + 4Y - 5Z = 25$
C) $5X - 3Y + 2Z = 12$

SYSTEMATIC REVIEW

30C

Find the solution that will satisfy all three variables.

A. $5X - 3Y + 3Z = 3$ B. $2X - 6Y - 4Z = 2$ C. $3X - 5Y + Z = -3$

1. Choose two equations and eliminate one variable.
2. Choose two different equations and eliminate the same variable.
3. Now take the results of #1 and #2, eliminate another variable, and solve.
4. Take the result of #3, substitute it into one of the equations from #1 or #2, and solve the equation.
5. Take the results of #3 and #4, substitute them into one of A, B, or C, and solve.
6. Check your solution set in A, B, and C.

Find the solution that will satisfy all three variables.

A. $3X + 2Y + 4Z = 9$ B. $4X + 3Y - 2Z = 6$ C. $5X + 4Y - 3Z = 8$

7. Choose two equations and eliminate one variable.
8. Choose two different equations and eliminate the same variable.
9. Now take the results of #7 and #8, eliminate another variable, and solve.

30 C

$$A) \quad 5x - 3y + 3z = 3$$

$$B) \quad x - 3y - 2z = 2$$

$$C) \quad 3x - 5y + z = -3$$

30 A.

$$A) \quad 3x + 6y - 4z = 17$$

$$B) \quad -x + 5y + 4z = 11$$

$$C) \quad x + y - 5z = 0$$

Lesson 30 Solving Equations with Three Variables

We know two methods for solving equations with two variables, substitution and elimination. To solve equations with three or more variables, the first step is to simplify the equations until we have two equations with two variables in each. When doing this, label the equations A, B, and C. Then transform two of them at a time, A&B, A&C, or B&C, until you've eliminated the same variables in each of them. Label these two new equations D & E. Using substitution or elimination, find the value of one of the variables. Take this answer and use it to find the other variable in D or E. Then substitute these two variables to find a solution for the third variable. Remember, what we are looking for is a solution which satisfies all three equations. After you have found the values for X, Y, and Z, check your answer in the equations to make sure it is the correct solution.

Example 1 Find the solution that will satisfy all three equations.

A) $2X + 3Y - Z = 11$	A + B = D	A) $2X + 3Y - Z = 11$ (x2) $4X + 6Y - 2Z = 22$	
B) $3X - Y + 2Z = 4$		B) $3X - Y + 2Z = 4$ (x1) $3X - Y + 2Z = 4$	
C) $4X + 2Y + 3Z = 8$	Eliminate Z	D) $7X + 5Y = 26$	Eliminate Y
	A + C = E	A) $2X + 3Y - Z = 11$ (x3) $6X + 9Y - 3Z = 33$	$(x - 11) - 77X - 55Y = -286$
		C) $4X + 2Y + 3Z = 8$ (x1) $4X + 2Y + 3Z = 8$	$(x - 5) 50X + 55Y = 205$
		E) $10X + 11Y = 41$	$-27X = -81$
			$X = 3$
Put X=3 in D.	D) $7(3) + 5Y = 26$	Put X=3 & Y=1 in A.	A) $2(3) + 3(1) - Z = 11$
	$21 + 5Y = 26$		$9 - Z = 11$
	$5Y = 5$		$-Z = 2$
	$Y = 1$		$Z = -2$
Check X=3, Y=1, Z=-2	A) $2(3) + 3(1) - (-2) = 11$	B) $3(3) - (1) + 2(-2) = 4$	C) $4(3) + 2(1) + 3(-2) = 8$
	A) $9 + 2 = 11$	B) $9 - 1 - 4 = 4$	C) $12 + 2 - 6 = 8$
	A) $11 = 11$	B) $4 = 4$	C) $8 = 8$

Example 2 Find the solution that will satisfy all three equations.

A) $3X + 2Y + 4Z = 9$	A + B = D	A) $3X + 2Y + 4Z = 9$ (x-3) $-9X - 6Y - 12Z = -27$	
B) $4X + 3Y - 2Z = 6$		B) $4X + 3Y - 2Z = 6$ (x2) $8X + 6Y - 4Z = 12$	
C) $5X + 4Y - 3Z = 8$	Eliminate Y	D) $-X - 16Z = -15$	Eliminate X
	A + C = E	A) $3X + 2Y + 4Z = 9$ (x-2) $-6X - 4Y - 8Z = -18$	$(x-1) X + 16Z = 15$
		C) $5X + 4Y - 3Z = 8$ (x1) $5X + 4Y - 3Z = 8$	$(x1) -X - 11Z = -10$
		E) $-X - 11Z = -10$	$5Z = 5$
			$Z = 1$
Put Z=1 in D.	D) $-X - 16(1) = -15$	Put X=-1 & Z=1 in A.	A) $3(-1) + 2Y + 4(1) = 9$
	$-X - 16 = -15$		$-3 + 2Y + 4 = 9$
	$-X = 1$		$2Y = 8$
	$X = -1$		$Y = 4$
Check X=-1, Y=4, Z=1	A) $3(-1) + 2(4) + 4(1) = 9$	B) $4(-1) + 3(4) - 2(1) = 6$	C) $5(-1) + 4(4) - 3(1) = 8$
	A) $-3 + 12 = 9$	B) $8 - 2 = 6$	C) $-5 + 13 = 8$
	A) $9 = 9$	B) $6 = 6$	C) $8 = 8$

Lesson 30 Solving Equations with Three Variables

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C) $4X + 2Y + 3Z = 8$	Eliminate Z	D) $7X + 5Y = 26$	Eliminate Y
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		E) $10X + 11Y = 41$	$-27X = -81$
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Example 2 Find the solution that will satisfy all three equations.

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C) $5X + 4Y - 3Z = 8$	Eliminate Y	D) $-X - 16Z = -15$	Eliminate X
	A + C = E	A) $3X + 2Y + 4Z = 9$ (x-2) $-6X - 4Y - 8Z = -18$	$(x-1) X + 16Z = 15$
		C) $5X + 4Y - 3Z = 8$ (x1) $5X + 4Y - 3Z = 8$	$(x1) -X - 11Z = -10$
		E) $-X - 11Z = -10$	$5Z = 5$
			$Z = 1$
Put Z=1 in D.	D) $-X - 16(1) = -15$	Put X=-1 & Z=1 in A.	A) $3(-1) + 2Y + 4(1) = 9$
	$-X - 16 = -15$		$-3 + 2Y + 4 = 9$
	$-X = 1$		$2Y = 8$
	$X = -1$		$Y = 4$
Check X=-1, Y=4, Z=1	A) $3(-1) + 2(4) + 4(1) = 9$	B) $4(-1) + 3(4) - 2(1) = 6$	C) $5(-1) + 4(4) - 3(1) = 8$
	A) $-3 + 12 = 9$	B) $8 - 2 = 6$	C) $-5 + 13 = 8$
	A) $9 = 9$	B) $6 = 6$	C) $8 = 8$