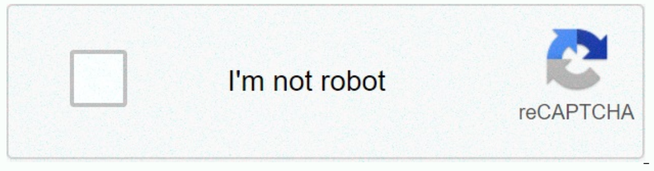

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Linear combination elimination method

Elimination Method Learning Objective(s) · Solve an equation system when multiplication is not required to eliminate a variable. · To eliminate a variable, solve an equation system when multiplication is required. · Get to know systems that don't have a solution or have an infinite number of solutions. · Resolve application problems using the elimination method. To solve linear equation systems, the elimination method uses the ability to add equality. You can add the same value to both sides of an equation. So if you have a system: x – 6 = −6 and x + y = 8, you can add x + y to the left side of the first equation and add 8 to the right side of the equation. Because X + y = 8, you add the same value to both sides of the first equation. Use Insert to Eliminate a Variable If you add two equations, x – y = −6 and x + y = 8 together, as mentioned above, watch what happens. You have eliminated the term Y, and this equation can be solved using methods of solving equations with a single variable. Let's see how this system is solved by the elimination method. Use elimination to solve sample Problem System. Add equations x – y = −6 x + y = 8. 2x = 2 x = 1 x. x + y = 8 1 + y = 8 y = 8 – 1 y = 7 Backup x = 1 solve one of the original equations and make sure that you check your answer in both equations correctly y. x – y = −6 1 – 7 = −6 −6 = −6 TRUE x + y = 8 1 + 7 = 8 = 8 = 8 true! Check for answers. Answer Solution (1, 7). Unfortunately, not all systems work that easily. How about a system like 2x + y = 12 and −3x + y = 2? If you put these two equations together, no variables have been eliminated. But you want to eliminate a variable. Let's add the opposite of one equation to the other equation. 2x + y =12 → 2x + y = 12 → 2x + 12 −3x + y = 2 → − (−3x + y) = −(2) → 3x – y = −2 5x + 0y = 10 Y and the problem can now be solved. See the example below. Use elimination to solve sample Problem System. 2x + y = 12 −3x + 2 2x + y = 12 −3x + y = 2 You can eliminate the y-variable if you add the reverse of one of the equations to the other equation. 2x + y = 12 3x – y = −2 5x = 10 Rewrite the second equation as the opposite. Add. x = 2 x. 2(2) + y = 12 4 + y = 12 y = 8 Instead of y = 2 add to one of the original equations and y. 2x + y = 12 2(2) + 8 = 12 + 8 = 12 12 = 12 TRUE −3x + y = 2 −3(2) + 8 = 2 −6 + 8 = 2 = 2 TRUE Be sure to check your answer in both equations! Check for answers. Answer Solution (2, 8). Here are two more examples of how to solve linear equation systems using elimination. Use elimination to solve sample Problem System. −2x + 3y = −1 2x + 5y = 25 −2x + 3y = −1 2x + 5y = 25 Notice the coefficients of each variable in each equation. If you add these two equations, the term x disappears from −2x + 2x = 0. −2x + 3y = −1 2x + 5y = 25 8y = 24 y = 3 Y. 2x + 5y = 25 2x + 5(3) = 25 2x + 15 = 25 2x = 10 x = 5 Instead of y = 3 add to one of the original equations and dissolve. −2x + 3y = −1 −2(5) + 3(3) = −1 −10 + 9 = −1 −1 −1 −1 = −1 TRUE 2x + 5y = 25 2(5) + 5(3) = 25 10 + 15 = 25 25 = 25 CORRECT Control solutions. Check for answers. Answer Solution (5, 3). Sample Problem X and y. 4x + 2y = 14 5x + 2y = 16 4x + 2y = 14 5x + 2y = 16 Use elimination to notice the coefficients of each variable in each equation. To eliminate the Y variable, you need to add the opposite of one of the equations, 2y + 2y = 4y, but 2y + (−2y) = 0. 4x + 2y = 14 −5x – 2y = −16 −x = −2 x = 2 = 2 = 2 x. 4x + 2y = 14 4(2) + 2y = 14 8 + 2y = 14 2y = 6 y = 3 Instead of x = 2 add to one of the original equations and y. Solve the answer solution (2, 3). Continue and control this last example instead of (2, 3) into both equations. You get two true expressions: 14 = 14 and 16 = 16! Note that you may have used the opposite of the first equation instead of the second equation to achieve the same result. Using Multiplication and Insertion to Eliminate a Variable Many times adding equations or adding the opposite of one of the equations does not result in the elimination of a variable. See the system below. 3x + 4y = 52 5x + y = 30 If you add the above equations or add the opposite of one of the equations, you will still get an equation with two variables. Now let's use the multipliing feature of equality first. You can multiply both sides of one of the equations by a number that results in the coefficient of one of the variables that is the opposite of the same variable in the other equation. This is where the impact comes in handy. Note that the first equation contains the term 4y and the second equation contains the term y. If you multiply the second equation by −4, the y variables are added up to 0 when you insert both equations. 3x + 4y = 52 → 3x + 4y = 52 → 3x + 4y = 52 5x + y = 30 → −4(5x + y) = −4(30) → −20x – 4y = −120 −17x + 0y = −68 See example below. Solve for Sample Problem X and y. Equation I: 3x + 4y = 52 Equation B: 5x + y = 30 Search for terms that can be eliminated. Equations do not have x or y terms with the same coefficients. 3x + 4y = 52 −4 (5x + y) = −4 (30) Multiply the second equation by −4 so that they have the same coefficient. 3x + 4y = 52 −20x – 4y = −120 Rewrite the system and add equations. x. 3x + 4y = 52 3(4) + 4y = 52 12 + 4y = 52 4y = 40 y = 10 Spare x = 4 to find resolution y to one of the original equations. 3x + 4y = 52 3(4) + 4(10) = 52 12 + 40 = 52 52 = 52 TRUE 5x + y = 30 5(4) + 10 = 30 20 + 10 = 30 30 = 30 CHECK YOUR CORRECT ANSWER. Check for answers. Answer Solution (4, 10). There are other ways to solve this system. Instead of multiplying an equation to eliminate a variable when equations are added, you may have multiplied both equations by different numbers. Let's remove the x variable this time. Multiply equation A by 5 and equation B by −3. Sample Problem X and y. 3x + 4y = 52 5x + y = 30 Search for terms that can be eliminated. Equations do not have x or y terms with the same coefficient. To use the 5 (3x + 4y) = 5 (52) 5x + y = 0 15x + 20y = 260 5x + y = 30 Elimination method, you must create variables with the same coefficient. Multiply the upper equation by 5. 15x + 20y = 260 -3 (5x + y) = −3 (30) 15x + 20y = 260 −15x – 3y = −90 Multiply the sub-equation by −3 now. Add 15x + 20y = + 260 −15x – 3y = – 90 17y = 170 y = 10 Add the next equations and y. 3x + 4y = 52 3x + 4(10) = 52 3x + 40 = 52 3x = 12 x = 4 Backup y = 10 x is the solution to one of the original equations to find (10). You're reaching the same solution as before. These equations were multiplied by 5 and −3 respectively, because this gave you terms to add up to 0. Make sure that the equation multiplies all its terms. Felix must find x and y in the following system. Equation A: 7y − 4x = 5 Equation B: 3y + 4x = 25 If he wants to use the elimination method to eliminate one of the variables that is the most effective way to do this? A) Insert Equation A and Equation B B) Add 4x to both sides of Equation A) Multiply equation A by 5) Multiply equation B by −1 Show/Hide Answer A) Insert Equation A and Equation B Correct. If Felix attaches two equations, the terms 4x and −4x are canceled, dropping 10y = 30. Felix will then be able to .B y.B) Equation A wrongly to add 4x to both sides. Adding 4x to both sides of Equation A does not change the value of the equation, but it does not help eliminate any of the variables—the rewritten equation results in 7y = 5 + 4x. The correct answer is to add Equation A and Equation B.C) Multiplication Equation by 5 Wrong. Multiplying equation A by 5 gives 35y − 20x = 25, which does not help you eliminate any of the variables in the system. Felix may now realize that both equations have a constant of 25, but that removing one from the other is not an effective way to solve this problem. Instead, it creates another equation with both variables. The correct answer is to multiply equation A and Equation B. D) Multiply equation B by −1 False. The multiplied equation B by −1 is −3y – 4x = −25, which does not help you eliminate any of the variables in the system. Felix may now notice that both equations have the term −4x, but adding them does not eliminate them, ingring you −8x. The correct answer is to add Equation A and Equation B. Just like the substitution method, the elimination method sometimes eliminates both variables and results in an accurate expression or an incorrect expression. Remember that a false statement means there is no solution. Let's look at a example. Add equations to eliminate the term Sample Problem X and y. -x - y = -4 x + y = 2 -x – y = -4 x + y = 2 0 = −2 x. Answer There's no solution. A graph of these lines shows that they are parallel lines and therefore confirm that they do not share a common point and are not solutions. If both variables are eliminated and you are left with an actual expression, this means that there are an infinite number of seated pairs that meet both equations. Actually, the equations are in the same line. Add equations to eliminate the term Sample Problem X and y. x + y = 2 -x − y = -2 x + y = 2 -x − y = -2 0 = 0 X. Answer There are an infinite number of solutions. A graph of these two equations will help show what's going on. Elimination Method using Application Problems Solving Elimination Method Can be applied to the solving systems of equations modeling real states. Here are two examples of using the elimination method for problem solving. Example Problem The sum of two numbers is 10. Differences 6. What are the two numbers? x + y = 10 x – y = 6 Type an equation system to model the state. Add equations to eliminate the term x = one number y = the other number x + y = 10 + x – y = 6 2x = 16 x = 8 Y, and then solve it for x. x + y = 10 8 + y = 10 y = 2 Change the value of X to one of the original equations. x + y = 10 8 + 2 = 10 10 = 10 TRUE x – y = 6 8 – 2 = 6 6 = 6 = 6 = 6 = 6 TRUE X = 8 and y = 2 to check your answer to the original system. Check for answers. Answer numbers 8 and 2. Case Problem One theater sold 800 tickets for Friday night's show. A children's ticket costs $4.50 and an adult ticket costs $6.00.The total amount raised is $4,500. How many each Sold tickets? The total number of tickets sold is 800. a + c = 800 The amount of money raised is $4,500 6a + 4.5c = 4,500 Equation system: a + c = 800 6a + 4.5c = 4,500 Write an equation system to model ticket sales status. a = number of adult tickets sold c = number of children's tickets sold 6(a + c) = 6(800) 6a + 4.5c = 4,500 6a + 6c = 4,800 6a + 4.5c = 4,500 Use multipliers to rewrite the first equation. 6a + 6c = 4,800 −6a – 4.5c = −4.500 1.5c = 300 c = 200 Eliminate a term and add the reverse equation in one of the original equations for c. a = 200 = 800 −200 a = 600 Substitute 200 c. a + c = 800 600 + 200 = 800 800 = 800 REAL 6a + 4.5c = 4.500 6(600) + 4.5(200) = 4,500 3,600 + 900 = 4,500 4500 = 4,500 TRUE Check your response by substitutioning one = 600 and c = 200 to the original system. Check for answers. Answer 600 adult tickets and 200 children's tickets sold out. Combine equations is a powerful tool for solving a system of equations. To eliminate a common variable, two equations are called insertion or subseation methods. Once one variable is eliminated, it becomes much easier to solve for the other. Multiplication can be used to set matching terms in equations before they are merged. When using the multiplication method, it is important to multiply all the terms on both sides of the equation, not just a term you are trying to eliminate. Eliminate.

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