Elimination method linear equations calculator

Welcome to Omni's elimination method calculator! It's here to help whenever you need to use the elimination method to solve a system of equations. The other name for this method is the linear combination method. So, what is the elimination method? How to solve a system with the elimination method? Scroll down! In the article below, we give the definition of the elimination method, explain a little bit of the math behind it, and go step-by-step through several examples of systems solved with the elimination method so that you can grasp all the details. We will also teach you how to do the elimination method when a system has infinitely many solutions or no solutions at all. We say that an equation is linear if all the variables that appear in that equation are in the first power. In particular, variables cannot be squared or cubed, nor put under a root or in the denominator of a fraction. The only thing you can do to variables is to multiply them by numbers and add such expressions together. If we have several linear equations and want to find numbers that solve all of these equations simultaneously, then we say we want to solve a system of linear equations. Our elimination method calculator works for systems of two linear equations in two variables. In general, such a system takes the form: a1x + b1y = c1 a2x + b2y = c2 where: x and y are the variables; a1, b1, c1 are the coefficients of the first equation; and a2, b2, c2 are the coefficients of the second equation. The elimination method is one methods used to solve systems of linear equations. The main idea behind this method is to get rid of one of the variables so that we can focus on a simpler equation. In particular, when we have a system of two linear equations in two variables and eliminate one variable, we are left with a single equation in just one variable! How do we eliminate variables? We multiply one or both equations by numbers that make the coefficients of a variable become opposite numbers on each equation (e.g., so we get 2x and -2x). Then we add the equations together - creating a resulting equation that doesn't contain that variable! We can now easily solve this equation using standard methods for solving equations with one variable. Once we have found the value of this variable, we substitute it into one of the original equations. This way, we obtain another equation with one variable. We solve it and that's it! This is how we use the elimination method to solve the system of equations. Go to the next section to learn more about the elimination method steps. Let us not forget about other methods for solving systems of linear equations! Once you have learned how to do the elimination method, you can move onto the substitution method, the Gaussian elimination method, or, if you are already familiar with the concept of matrix determinant, Cramer's rule. You already know what the elimination method is all about, so let's discuss how to do the elimination method when given a specific system of linear equations in more detail. If needed, rearrange the equations so that the variables appear in the same order. If needed, multiply the equations so that one variable can be eliminated by addition. Add the equations together to eliminate this variable. This is essence of the solving by elimination method! You get a one-variable equation - solve for this variable. Substitute the value for this variable into one of the original equations. Solve for the other variable. Just to be sure, you may want to test your solution. Substitute it into the system and see if everything is OK. The most critical step (and the only one which can cause problems) is to transform the system in a way that allows for the elimination of a variables, i.e., Step 2. In the next section, we will explain it in more detail and show you a bit of the math behind the elimination method. After that we will move onto discussing several examples of elimination method. The use of the elimination method calculator is straightforward: Enter the coefficients in their respective fields. The complete solution appears below the elimination method calculator. If you just need the pair of numbers that satisfy the system, they are near the end of the calculator's output. All the elimination method steps, along with explanations, are here as well in case you need them. If you need the solution computed with a higher precision (number of sig figs), go to the advanced mode of the elimination method calculator to set the desired precision. By default, we display six sig figs. The best situation you can encounter is when the coefficients of one variable are opposite numbers. When you add the equations together, this variable vanishes! More often, however, there are no opposite coefficients. It is your task to create them by multiplying both sides of one or both equations by suitably chosen multipliers. Only then will you be able to use the elimination method to solve the system of equations. The main task is to guess the multipliers. A simple example is when the coefficients of a variable are equal - in such case it is enough to multiply one of the equations by -1. This creates opposite coefficients. Then you only need to add the equations to eliminate this variable. In general, for the system of equations: a1x + b1y = c1 a2x + b2y = c2 we resort to the notion of the least common multiple of two numbers. Namely, we define the multipliers m1 and m2 as follows: m1 := LCM(a1, a2) / a1 m2 := LCM(a1, a2) / a2 and multiply the first equation by m1 and the second equation by -m2. As a result, we get the following system: LCM(a1, a2)x + [LCM(a1, a2)b1/a1]y = LCM(a1,a2)c1/a1 -LCM(a1, a2)x - [LCM(a1, a2)b2/a2]y = -LCM(a1, a2)c2/a2 As you can see, we have created opposite coefficients for the variable x (they are equal to LCM(a1, a2) and -LCM(a1, a2)). By adding these equations together, we eliminate x and end up with an equation containing only one variable: y. Solving such single-variable equations is very easy, as you'll see in the examples below. When trying to eliminate a variable, you may sometimes eliminate both variables! What to do in such a situation? If you have eliminated both variables, you will end up with a statement concerning numbers. This statement is either true or false. Examples of true statements are: 4 = 4 or 0 = 0, and examples of false statements are: 4 = 5 or 0 = 1. It's not difficult, right? Depending on whether the statement you got is true or false, you can make conclusions about the system: If you eliminated both variables and the final statement is false, then your system of equations has no solution. If you eliminated both variables and the final statement is true, then your system has infinitely many solutions. In this section, we will look at several examples to get a better idea of how to use the elimination method in math to solve systems of equations. Use the elimination method to solve the system of equations: 3x - 4y = 6 -x + 4y = 2 Eliminate y by adding the two equations together: 2x = 8 Solve for x: x = 4 Substitute x = 4 into the second equation: -4 + 4y = 2 Solve for y: 4y = 6 y = 1.5 Solution: x = 4, y = 1.5 We test the solution: 3 · 4 - 4 · 1.5 = 12 - 6 = 6 So the first equation is OK. -4 + 4 · 1.5 = -4 + 6 = 2 And the second equation is OK as well. Solve using elimination method: 2x + 3y = 5 2x + 7y = -3 We want to eliminate x this time. To this end, we first multiply the first equation by -1: -2x - 3y = -5 2x + 7y = -3 Add the equations, which results in eliminating x: 4y = -8 Solve for y: y = -2 Substitute y = -2 into the first equation: 2x + 3 · (-2) = 5 Solve for x: 2x = 11 x = 5.5 Solution: x = 5.5, y = -2 Now, we will see how to solve with the elimination method the following system of linear equations: 3x - 3y = 0 2x + y = 3 We see that neither variable has equal or opposite coefficients. We will have to create them using multipliers, as we explained above. Let's eliminate x. First, calculate the least common multiplicity of 2 and 3: LCM(2, 3) = 6. The multipliers are: m1 := 6 / 3 = 2 and m2 := -6 / 2 = -3. Hence, we multiply the first equation by 2 and the second equation by -3: 6x - 6y = 0 -6x - 3y = -9 Add the equations: -9y = -9 Solve for y: y = 1 Substitute y = 1 into the first equation: 3x - 3 · 1 = 0 Solve for x: 3x = 3 x = 1 Solution: x = 1, y = 1 Next, let's see how to use the elimination method in case of the system: 6x - 3y = 12 2x - y = 4 To eliminate y, multiply the second equation by -3 so that the coefficients of y are opposite numbers: 6x - 3y = 12 -6x + 3y = -12 Add the equations: 0 = 0 We eliminated both variables and arrived at a true statement. Therefore, there are infinitely many solutions for this system of equations! Finally, let's solve using the elimination method: -4x + 8y = 5 3x - 6y = -1 To eliminate x, we multiply the first equation by 3 and the second equation by 4: -12x + 24y = 15 12x - 24y = -4 Add the equations: 0 = 11 We eliminated both variables and arrived at a blatantly false statement. We conclude that our system of equations has no solution. Show Slider x+y=5;x+2y=7 Enter your equations separated by a comma in the box, and press Calculate! Or click the example. Use elimination when you are solving a system of equations and you can quickly eliminate one variable by adding or subtracting your equations together. You can use this Elimination Calculator to practice solving systems. Need more problem types? Try MathPapa Algebra Calculator In Algebra, Linear Equation is a function where each terms is a constant or the product of the constant and a single variable. The addition method of solving systems of equations is also called the method of elimination. A linear equation is general can be written as, ax+by+c=0, where a and b are not both equal to zero. A linear equation is an equation for a straight line. This online algebra calculator helps you in solving the systems of linear equations by addition or elimination method. This website uses cookies to ensure you get the best experience. 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Learn more Solve system of equations unsing elimination method step-by-step \bold{\mathrm{Basic}} \bold{\alpha\beta\gamma} \bold{\mathrm{AB\Gamma}} \bold{\sin\cos} \bold{\ge\div\rightarrow} \bold{\overline{x}\space\mathbb{C}\forall} \bold{\sum\space\int\space\product} \bold{\begin{pmatrix}\square&\square\\\square&\square\end{pmatrix}} \bold{H_{2}O} \square^{2} x^{\square} \sqrt{\square} throot[\msquare]{\square} \frac{\msquare}{\msquare} \log_{\msquare} \pi \theta \infty \int \frac{d}{dx} \ge \le \cdot \div x^{\circ} (\square) |\square| (f\:\circ\:g) f(x) \ln e^{\square} \left(\square\right)^{'} \frac{\partial}{\partial x} \int_{\msquare}^{\msquare} \lim \sum \sin \cos \tan \cot \csc \sec \alpha \beta \gamma \delta \zeta \eta \theta \iota \kappa \lambda \mu u \xi \pi \rho \sigma \tau \upsilon \phi \chi \psi \omega A B \Gamma \Delta E Z H \Theta K \Lambda M N \Xi \Pi P \Sigma T \Upsilon \Phi X \Psi \Omega \sin \cos \tan \cot \sec \csc \sinh \cosh \tanh \coth \sech \arcsin \arccos \arctan \arccot \arcsec \arccsc \arcsinh \arccosh \arctanh \arccoth \arcsech + - = \div / \cdot \times < > \le \ge (\square) [\square] ▭\:\longdivision{▭} \times \twostack{▭}{▭} + \twostack{▭}{▭} - \twostack{▭}{▭} \square! x^{\circ} \rightarrow \lfloor\square\rfloor \lceil\square\rceil \overline{\square} \vec{\square} \in \forall otin \exist \mathbb{R} \mathbb{C} \mathbb{N} \mathbb{Z} \emptyset \vee \wedge eg \oplus \cap \cup \square^{c} \subset \subsete \superset \supersete \int \int\int \int\int\int \int_{\square}^{\square} \int_{\square}^{\square}\int_{\square}^{\square} \int_{\square}^{\square}\int_{\square}^{\square}\int_{\square}^{\square} \sum \prod \lim \lim _{x\to \infty } \lim _{x\to 0+} \lim _{x\to 0-} \frac{d}{dx} \frac{d^2}{dx^2} \left(\square\right)^{'} \left(\square\right)^{''} \frac{\partial}{\partial x} (2\times2) (2\times3) (3\times3) (3\times2) (4\times2) (4\times3) (4\times4) (3\times4) (2\times4) (5\times5) (1\times2) (1\times3) (1\times4) (1\times5) (1\times6) (2\times1) (3\times1) (4\times1) (5\times1) (6\times1) (7\times1) \mathrm{Radians} \mathrm{Degrees} \square! ( ) % \mathrm{clear} \arcsin \sin \sqrt{\square} 7 8 9 \div \arccos \cos \ln 4 5 6 \times \arctan \tan \log 1 2 3 - \pi e x^{\square} 0 . \bold{=} + \mathrm{substitution} \mathrm{elimination} \mathrm{cramer} \mathrm{gauss\:jordan} \mathrm{simplify} See All area asymptotes critical points derivative domain eigenvalues eigenvectors expand extreme points factor implicit derivative inflection points intercepts inverse laplace inverse laplace partial fractions range slope simplify solve for tangent taylor vertex geometric test alternating test telescoping test pseries test root test Related » Graph » Number Line » Examples » Our online expert tutors can answer this problem Get step-by-step solutions from expert tutors as fast as 15-30 minutes. Your first 5 questions are on us! In partnership with You are being redirected to Course Hero I want to submit the same problem to Course Hero Examples elimination-system-of-equations-calculator en Feedback Any content, trademark/s, or other material that might be found on the hotelsrate.org website that is not hotelsrate.org property remains the copyright of its respective owner/s. In no way does hotelsrate.org claim ownership or responsibility for such items, and you should seek legal consent for any use of such materials from its owner. Copyright © 2017 HOTELSRATE.ORG - All rights reserved Matrix input You can copy and paste the entire matrix right here. Elements must be separated by a space. Each row must begin with a new line. « Substitution Method Solving System of Linear Equations: (lesson 2 of 5) The elimination method of solving systems of equations is also called the addition method. To solve a system of equations by elimination we transform the system such that one variable "cancels out". Example 1: Solve the system of equations by elimination $$ \begin{aligned} 3x - y &= 5 \\ x + y &= 3 \end{aligned} $$ Solution: In this example we will "cancel out" the y term. To do so, we can add the equations together. $$ \begin{aligned} &\underline{\left. \begin{aligned} 3x \color{red}{- y} = 5\\ x \color{red}{+ y} = 3 \end{aligned} \right\}} \text{Add equations}\\ &4x = 8 \end{aligned} $$ Now we can find: $x = 2$ In order to solve for y, take the value for x and substitute it back into either one of the original equations. $$ \begin{aligned} \color{red}{x} + y &= 3 \\ \color{red}{2} + y &= 3 \\ y &= 1 \end{aligned} $$ The solution is $(x, y) = (2, 1)$. Example 2: Solve the system using elimination $$ \begin{aligned} x + 3y &= -5 \\ 4x - y &= 6 \end{aligned} $$ Solution: Look at the x - coefficients. Multiply the first equation by -4, to set up the x-coefficients to cancel. $$ \begin{aligned} &x + 3y = -5 \color{red}{\,\,\,\,\text {multiply by -4}}\\ &\underline{4x - y = 6} \end{aligned}\\ \begin{aligned} &\underline{\left. \begin{aligned} \color{red}{- 4x} - 12y= 20\\ \color{red}{4}x - y = 6 \end{aligned} \right\}} \text{Add equations}\\ &-13x = 26 \end{aligned} $$ Now we can find: $y = -2$ Take the value for y and substitute it back into either one of the original equations. $$ \begin{aligned} x + 3y &= -5 \\ x + 3\cdot(\color{red}{-2}) &= -5\\ x - 6 &= -5\\ x &= 1 \end{aligned} $$ The solution is $(x, y) = (1, -2)$. Example 3: Solve the system using elimination method $$ \begin{aligned} 2x - 5y &= 11 \\ 3x + 2y &= 7 \end{aligned} $$ Solution: In this example, we will multiply the first row by -3 and the second row by 2; then we will add down as before. $$ \begin{aligned} &2x - 5y = 11 \color{red}{\,\,\,\, \text {multiply by -3}}\\ &\underline{3x + 2y = 7 \color{red}{\,\,\,\, \text {multiply by 2}}} \end{aligned}\\ \begin{aligned} &\underline{\left. \begin{aligned} \color{red}{- 6} + 15y = -33\\ \color{red}{6}x + 4y = 14 \end{aligned} \right\}} \text{Add equations}\\ &19y = -19 \end{aligned} $$ Now we can find: y = -1 Substitute y = -1 back into first equation: $$ \begin{aligned} 2x - 5\color{blue}{y} &= 11 \\ 2x - 5\cdot\color{blue}{(-1)} &= 11\\ 2x + 5 &= 11\\ \color{blue}{x} &\color{blue}{=} \color{blue}{3} \end{aligned} $$ The solution is $(x, y) = (3, -1)$. Exercise: Solve the following systems using elimination method