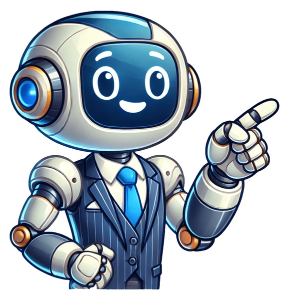

In mathematics, polynomial functions are foundational to algebra, calculus, and beyond. Whether you're a student solving homework problems, a teacher crafting lesson plans, or an engineer modeling real-world systems, being able to evaluate polynomial expressions is crucial. That's where our Polynomial Function Calculator comes in — a free, user-friendly online tool that allows you to calculate the value of any polynomial function at a given x-value in just seconds. A polynomial function is an algebraic expression that involves a sum of powers in one or more variables multiplied by coefficients. For example:f(x) = 2x² + 3x - 5Here:2x² is the quadratic term,3x is the linear term,-5 is the constant.Polynomials can be simple or complex depending on the number of terms and the degree (highest power of x).The Polynomial Function Calculator simplifies the process of evaluating these expressions. Instead of manually solving equations or using complex math software, you can simply:Enter the polynomial expression.Specify the value of x.Click Calculate to get an instant result.This tool is particularly useful for:Students checking homework or preparing for testsTeachers verifying solutionsEngineers analyzing formulasAnyone working with polynomial mathUsing the calculator is straightforward. Here's a step-by-step breakdown:Enter your polynomial into the "Polynomial" input field. For example:2x^2 + 3x - 5 Tip: You can use expressions like x^3, -4x^2, +7x, or constants like -6.Enter the numerical value of x in the "Value of x" field. You can use whole numbers, decimals, or negative numbers (e.g., -2, 3.5, 0).Click the Calculate button. The result will be displayed below, showing the evaluated result of the polynomial at that x value.Click Reset to clear the inputs and start a new calculation.Let's go through an example:Input:Polynomial: 2x^2 + 3x - 5Value of x: 2Process:f(2) = 2(2)^2 + 3(2) - 5 = 2*4 + 6 - 5 = 8 + 6 - 5 = 9Output:Result: 9.0000The JavaScript function in the background takes your polynomial expression and dynamically converts it into a format the browser can understand.Key features include:Automatic parsing of expressions like 2x^2 into 2*Math.pow(x,2)Handling implicit multiplication (2x → 2*x)Evaluating the result using the built-in Function constructorInput validation to ensure the expression is in correct polynomial formThe calculator supports:Any real number as input for xDecimal and negative coefficientsStandard mathematical syntax with x^n notationThere are several reasons why using an online polynomial calculator like this is valuable:Speed: Instantly evaluates complex expressions.Accuracy: Eliminates human calculation errors.Accessibility: Use it on any device with a browser — no software needed.Learning Tool: Great for students to verify homework and understand polynomial behavior.Convenience: Saves time compared to doing calculations by hand.Evaluate polynomial functions of any degree (linear, quadratic, cubic, etc.)Accepts positive and negative coefficientsHandles decimal numbersDisplays result rounded to 4 decimal placesAlgebra practice: Quickly check answers.Teaching aid: Demonstrate real-time results to students.Engineering problems: Model polynomial behavior.Graphing preparation: Use output for plotting values on graphs.Exam prep: Save time during study sessions.It can evaluate polynomials of any degree as long as they are entered in proper format.Yes, decimal coefficients and x-values are fully supported.Absolutely! It's a free, browser-based tool.Use standard algebraic format, like 3x^2 + 2x - 7.Yes. 3x is interpreted as 3x^1 automatically.No, it currently supports only one-variable polynomial functions (x).The calculator will show an error if the format is invalid.No, it evaluates the polynomial at a single x-value at a time.Yes, it shows an "Invalid polynomial format" message.No, it only works with expressions in terms of x.Currently, it doesn't support parentheses for grouping.No, it only provides the final result for the given x.All modern browsers including Chrome, Firefox, Safari, and Edge.Yes, results are computed using JavaScript's math engine and rounded to four decimals.It's recommended to avoid scientific notation for best results.Definitely. It's a great visual aid for teaching polynomial evaluation.No, everything runs locally in your browser without storing any data.At the moment, it's available only online.The Polynomial Function Calculator is a fast, reliable, and accessible solution for evaluating any polynomial expression. Whether you're a student, teacher, or professional, this tool takes the complexity out of polynomial math and provides immediate results.Say goodbye to manual calculations and welcome instant accuracy! Bookmark this tool and use it whenever you need quick polynomial evaluations. There's a particular kind of silence that settles over a page when a math problem stares back without blinking. A dense line of x's and exponents, each term a small puzzle, each sign a gate that won't open. Polynomial equations carry this weight. Not just because they look intimidating, but because they ask for so many small decisions in a row. Where to begin. What to factor. Whether to try again after getting it wrong. A Polynomial Equation Calculator, especially one built for learning, not just answering, offers something else entirely. This is a guide not for racing ahead, but for staying with it. A slow, thoughtful walk through polynomial equations—what they are, how they unfold, and how quiet tools like Symbolab help reveal the shape of the solution already waiting inside. What Is a Polynomial Equation? Some problems speak in fragments. Polynomial equations speak in patterns. Each one is made of terms—little bundles of variable and number, sometimes squared, sometimes cubed, sometimes multiplied by constants so large they seem to tip the whole thing sideways. But always, always arranged in a rhythm: highest power to lowest, one term stepping down after another until the whole expression lands in silence—equals zero. Something like: $3x^2 - 5x + 2 = 0$ Or, more formally: $a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0 = 0$ No variables in denominators. No square roots thrown in for chaos. Just powers of x stacked like stairs, leading to the root. Because that's the quiet goal of all this: finding the x that makes the whole thing hold still. Degrees of Polynomial Equations (And Why They Matter) The degree of a polynomial is the highest exponent it carries.It tells how many roots to expect—how many times the graph might cross the x-axis, how many moments of balance exist inside the storm of variables. It shapes the entire strategy, like knowing the genre before picking up a novel. A linear equation (degree 1) offers one clean solution, no curves, no fuss. A quadratic (degree 2) usually folds into a soft U or an upside-down arch, meeting the axis once or twice—or not at all, but still living. A cubic (degree 3) twists, Turn, Sometimes dips below, sometimes loops around. Up to three roots, each a possible resolution. And anything higher—quadratic, quintic, beyond—becomes something more abstract. Not unsolvable, just layered. Like stories with multiple endings. How to Solve Polynomial Equations: The Approaches There's no single way to solve a polynomial. Just a collection of doorways. Each method carries its own logic. Its own pace. Some problems offer their solutions right away. Others ask to be read again. These are the most familiar paths: 1. Factoring (When Possible) Some equations almost want to be understood. Like they're waiting for the right person to notice the pattern. Factoring is the gentle art of breaking something whole into parts that still carry meaning. Take something like: $x^2 - 5x + 6 = 0$ The numbers whisper their own logic—two values that multiply to 6 and add to −5. And just like that: $(x - 2)(x - 3) = 0$ Now the roots arrive without resistance: $x = 2$ and $x = 3$ The equation lets go of its tension. But not all polynomials are this kind. Some resist factoring. Some need regrouping. Some hide their symmetry behind prime coefficients or irreducible trinomials. Factoring isn't failure-proof. 2. The Quadratic Formula There's a rhythm to this one. A kind of mathematical poetry. $x = (-b \pm \sqrt{b^2 - 4ac}) / 2a$ For any equation shaped like $ax^2 + bx + c = 0$, this formula works every time. Whether the roots are real or imaginary, clean or cluttered with radicals, the solution unfolds all the same. Slowly. Precisely. And that little square root part? It holds secrets. If the discriminant $(b^2 - 4ac)$ is positive, two distinct real roots step forward. If it's zero, there's just one—repeating, quietly confident. If it's negative, the roots vanish from the graph and reappear in the complex plane. 3. Synthetic Division or Long Division Sometimes, solving means stripping a polynomial down—term by term, degree by degree—until what's left is simpler. That's where division comes in. Not the quick kind, but the careful, drawn-out version. Either long division, where each step stretches across the page like old handwriting, or synthetic division, a tidier shortcut when certain conditions are just right. These methods are especially useful when working with higher-degree polynomials—equations too big or too stubborn to factor on sight. Division helps peel away one factor at a time, like layers of something too dense to tackle all at once. It starts with a guess—a potential root, often something small and rational. If the remainder is zero, it means that root fits. The equation shrinks. And what's left behind? A smaller polynomial, easier to work with. Something that can be factored. Or solved by formula. Or tested again. It's a method that rewards patience. One term falls. Then another. Until all that's left is the core. 4. Graphing to Estimate Roots Graphing offers a different kind of clarity—the visual kind. Where the equation becomes a curve. Where x-intercepts mark the roots. And where understanding feels less like computation and more like recognition. A quadratic draws a parabola—rising or falling, dipping or arching. A cubic might twist and turn. Higher degrees ripple like waves or fold into themselves. But the intercepts, where the curve meets the x-axis? Those are the solutions. Or approximations of them. Some are neat. Whole numbers that land right on the grid. Others are irrational, messy decimals, floating between lines. And some don't appear at all—imaginary roots that live off the graph, in places visual tools can't reach. Still, even then, the graph offers something. A sense of movement. A shape. A hint at where to look next. Sometimes the math doesn't make sense yet. But the picture does. Bonus: The Fundamental Theorem of Algebra There's a comforting certainty tucked inside this theorem, even if the name feels intimidating. It says: every polynomial of degree n has exactly n roots. Some may be real. Some complex. Some repeated. But they're there. Always. Without exception. So even when the equation feels impossible, the theorem quietly promises—there is an answer. Or two. Or five. It might take graphing. Or dividing. Or asking Symbolab for help. But the roots exist. Somewhere beneath the surface. Understanding the Results: Types of Roots Not all solutions arrive the same way. Some step forward clearly, confidently. Others hide in decimals or imaginary numbers. But each one tells part of the story the equation was holding. There are three kinds of roots to understand—not to memorize or fear, just to notice. To name. Real Roots These are the most visible. The ones that can be seen on a graph—those spots where the curve crosses or touches the x-axis. They might be clean whole numbers, like 2 or −4. Or they might stretch out into irrational territory—square roots and long decimals, hard to write down but undeniably there. Real roots are tangible. Measurable. They show up when plotted. They can be confirmed again and again. Complex Roots Then there are roots that don't appear on the graph—not because they're wrong, but because they live in a different kind of space. They include imaginary numbers—roots involving i, the square root of -1. They usually come in pairs, mirror images of each other: $2 + 3i$ and $2 - 3i$ Together, they keep the balance, even if they stay off the axis. Complex roots don't show up in visual plots, but they exist in the logic. They're the silent corrections that make the math work, even when the surface looks empty. Repeated Roots (Multiplicity) And sometimes, a root appears more than once. Take $(x - 3)^2 = 0$. The solution is still $x = 3$, but it's a double root—it counts twice. And the graph will show this too. Instead of crossing the x-axis, the curve just brushes against it and turns back. Like a pause. Like a hesitation. Like the equation touched stillness and moved on. This is called multiplicity. It changes how the graph behaves, how the solution fits, and how the story is told. Common Mistakes and How the Calculator Helps Mistakes in polynomial equations come from doing everything right except the one tiny thing that quietly unraveled the rest. Here are a few of the usual mistakes: Not writing the equation in standard form When terms are out of order or not all on the same side, the equation becomes harder to read—like trying to follow a story told backwards. Solutions still exist, but they're harder to see. Forcing factoring when it doesn't fit Factoring isn't always possible, and not all quadratics want to break apart neatly. Sometimes what looks factorable isn't. Sometimes it is, but no one sees it. Ignoring complex roots When the square root turns negative, panic often sets in. But those imaginary numbers aren't errors—they're just part of the math's deeper landscape. Missing repeated roots Some roots don't just happen once. They echo. But without graphing or careful attention, multiplicity can slip by unnoticed. The mistakes aren't failures. They're invitations—to slow down and solve the equation again. Real-Life Applications of Polynomial Equations Polynomial equations rarely introduce themselves in real life. They don't walk into a room and say, "Hello, I'm a fourth-degree expression—solve me." But they're there. In physics, they model acceleration, trajectory, resistance. A falling object, a thrown stone, a rocket—each finds its curve through polynomials. In engineering, they help map pressure, stress, material strength. Whether a structure holds or collapses can depend on solving the right equation at the right time. In economics, they forecast profits and losses, model supply and demand, sketch the rise and fall of markets not yet born. In biology, they describe how populations grow, decline, stabilize. How chemicals react. How diseases spread or fade. In animation and design, they craft smooth motion—make a character walk, make a landscape roll by, make a digital world feel just a little more real. How to Use Symbolab's Polynomial Equation Calculator Some tools are built for people who already know what they're doing. Symbolab is built for the people still figuring it out—the ones who just need someone to walk slowly beside them, showing how to get from here to there without making them feel left behind. Whether the equation is typed out, written by hand, snapped in a photo, or copied from a screen, Symbolab Polynomial Equation Calculator has a way in. Here's how to begin: Step 1: Share the Equation There's no single right way to input the problem. Symbolab accepts almost anything: Type it in words something like "solve x cubed minus 4 x squared plus 5 x minus 2 equals zero" Use math symbols like $x^3 - 4x^2 + 5x - 2 = 0$ Upload a photo or snapshot of handwritten work, scanned from paper or scribbled in class Paste a screenshot from a textbook or online problem Use the Chrome extension to highlight any equation on a webpage and solve it instantly The tool doesn't flinch at the format. It reads what's there and begins. Step 2: Click "Go" Just a tap.Symbolab receives the problem and gets to work. Step 3: Watch the Steps Unfold No sudden jumps. No unexplained results. Each part of the solution is broken into small, digestible moves. If the equation can be factored, it shows how. If the quadratic formula is needed, it explains why. If division must be used, it moves through every line. Step 4: Explore the Graph For visual learners, this is where things click. The curve appears—arching, dipping, touching the axis where the roots live. The algebra becomes a shape. The solution becomes a point. Step 5: Review and Try Again (If Needed) Sometimes, seeing it once isn't enough. Symbolab keeps the door open. Try a similar problem. Adjust a coefficient. Ask "what if?" and watch how the curve changes. Conclusion Polynomial equations can feel like too much—too many steps, too many chances to get it wrong. But tools like Symbolab remind us that clarity is possible. Each step shown, each mistake caught, each answer explained. It's not just about solving—it's about understanding. And in a world that often rushes, that kind of steady support matters more than it lets on. Frequently Asked Questions (FAQ) How do you solve polynomials equations? To solve a polynomial equation write it in standard form (variables and canstants on one side and zero on the other side of the equation). Factor it and set each factor to zero. Solve each factor. The solutions are the solutions of the polynomial equation. What is polynomial equation? A polynomial equation is an equation formed with variables, exponents and coefficients. The highest exponent is the order of the equation. A non-polynomial function or expression is one that cannot be written as a polynomial. Non-polynomial functions include trigonometric functions, exponential functions, logarithmic functions, root functions, and more. Like any constant zero can be considered as a constant polynimial. It is called the zero polynomial and have no degree. We've updated our Privacy Policy effective December 15. Please read our updated Privacy Policy and tap \mathrm{simplify} \mathrm{solve\:for} \mathrm{expand} \mathrm{factor} \mathrm{rationalize} See All AI may present inaccurate or offensive content that does not represent Symbolab's views. View Full Notebook The zeros of a function, also known as roots or x-intercepts, are the values of x where the function equals zero. In other words, they are the points where the graph of the function crosses the x-axis. Finding the zeros of a function is crucial in mathematics and various real-world applications, as it helps understand the behavior of the function and solve equations. For polynomial functions, zeros can be real numbers, complex numbers, or a combination of both. The number of zeros a polynomial has is equal to its degree, although some of these zeros may be repeated. For example, a quadratic equation (degree 2) will have two zeros, which can be real and distinct, real and repeated, or complex conjugates. 1. Enter the equation: In the input field, type your polynomial equation. Use standard mathematical notation, with "^" for exponents. For example, to find the zeros of $x^2 - 4x + 4$, enter "x^2 - 4x + 4". 2, Click "Calculate Zeros": After entering your equation, click the "Calculate Zeros" button. The calculator will show you the zeros of the function. These may be real numbers, complex numbers, or a combination of both. The zeros are displayed in a comma-separated list. This calculator is designed for polynomial equations. For transcendental functions (like trigonometric or exponential functions), finding zeros may require more advanced numerical methods not implemented in this basic calculator. Please ensure that your password is at least 8 characters and contains each of the following: a number a letter a special character: @$#!%*?& In order to continue enjoying our site, we ask that you confirm your identity as a human. Thank you very much for your cooperation. Calculators :: Polynomial Calculators :: Polynomial Roots Calculator This free math tool finds the roots (zeros) of a given polynomial. The calculator computes exact solutions for quadratic, cubic, and quartic equations. Calculator shows all the work and provides step-by-step on how to find zeros and their multiplicities. Examples Find roots of the polynomial 4x2-10x+4 Find polynomial roots -2x4-x^3+189 Solve equation 6x3-25x3+2x+8=0 Find polynomial roots 2x3-x2-x-3 Find roots 2x4-x4-14x3-6x2+24x+40 Find more worked-out examples in our database of solved problems. Search our database with more than 300 calculators TUTORIAL The process of finding polynomial roots depends on its degree. The degree is the largest exponent in the polynomial. For example, the degree of polynomial p(x)=8x2+3x-1 is 2. We name polynomials according to their degree. For us, the most interesting ones are: quadratic (degree = 2), Cubic (degree=3) and quartic (degree = 4). This is the standard form of a quadratic equation is ax2+bx+c=0 The formula for the roots is $$ x_1, x_2 = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a} $$ Example 01: Solve the equation 2x2+3x-14. In this case we have a=2, b=3, c=-14, so the roots are: $$ \begin{aligned} x_1, x_2 &= \dfrac{-b \pm \sqrt{b^2-4ac}}{2a} \\ x_1, x_2 &= \dfrac{-3 \pm \sqrt{3^2-4 \cdot 2 \cdot (-14)}}{2\cdot2} \\ x_1, x_2 &= \dfrac{-3 \pm \sqrt{9 + 4 \cdot 2 \cdot 14}}{4} \\ x_1, x_2 &= \dfrac{-3 \pm \sqrt{121}}{4} \\ x_1, x_2 &= \dfrac{-3 \pm 11}{4} \\ x_1 &= \dfrac{-3 + 11}{4} = \dfrac{8}{4} = 2 \\ x_2 &= \dfrac{-3 - 11}{4} = \dfrac{-14}{4} = -\dfrac{7}{2} \end{aligned} $$ Sometimes, it is much easier not to use a formula for finding the roots of a quadratic equation. Example 02: Solve the equation 2x2+3x=0. Because our equation now only has two terms, we can apply factoring. Using factoring, we can reduce an original equation to two simple equations. $$ \begin{aligned} 2x^2 + 3x &= 0 \\ \color{red}{x} \cdot \left(\color{blue}{2x + 3} \right) &= 0 \\ \color{red}{x = 0} \,\,\, \color{blue}{2x + 3} & \color{blue}{= 0} \\ \color{blue}{2x } & \color{blue}{= -3} \\ \color{blue}{x} &\color{blue}{= -\frac{3}{2}} \end{aligned} $$ Example 03: Solve equation 2x2-18=0 This is also a quadratic equation that can be solved without using a quadratic formula. 2x2 - 18 = 0 2x2 = 18 x2 = 9 The last equation actually has two solutions. The first one is obvious $$ \color{blue}{x_1 = \sqrt{9} = 3} $$ and the second one is $$ \color{blue}{x_2 = -\sqrt{9} = -3 }$$ To solve a cubic equation, the best strategy is to guess one of three roots. Example 04: Solve the equation 2x3-4x2-3x+6=0. Step 1: Guess one root. The good candidates for solutions are factors of the last coefficient in the equation. In this example, the last number is -6 so our guesses are: 1, 2, 3, 6, -1, -2, -3 and -6 If we plug in x=2into the equation we get, $$ 2 \cdot \color{blue}{2}^3 - 4 \cdot \color{blue}{2}^2 - 3 \cdot \color{blue}{2} + 6 = \\\\ 2 \cdot 8 - 4 \cdot 4 - 6 - 6 = 0$$ So, x=2 is the root of the equation. Now we have to divide polynomial by x-ROOT. In this case we divide 2x3-x2-3x+6 by x-2. (2x3-x2-3x+6)/(x-2) = 2x2-3 Now we use 2x2-3 to find remaining roots $$ \begin{aligned} 2x^2 - 3 &= 0 \\ 2x^2 &= 3 \\ x^2 &= \frac{3}{2} \\ x_1 & = \sqrt{ \frac{3}{2} } = \frac{\sqrt{6}}{2}\\ x_2 &= -\sqrt{ \frac{3}{2} } = - \frac{\sqrt{6}}{2} \end{aligned} $$ To solve cubic equations, we usually use the factoring method. Example 05: Solve equation 2x3-4x2-3x+6=0. Notice that a cubic polynomial has four terms, and the most common factoring method for such polynomials is factoring by grouping. $$ \begin{aligned} & 2x^3 - 4x^2 - 3x + 6 = \\ &=\color{blue}{2x^3-4x^2} \color{red}{-3x + 6} = \\ &= \color{blue}{2x^2(x-2)} \color{red}{-3(x-2)} = \\ &= (x-2)(2x^2 - 3) \end{aligned} $$ Now we can split our equation into two smaller equations, which are much easier to solve. The first one is x-2=0 with a solution x=2, and the second one is 2x2-3=0. $$ \begin{aligned} 2x^2 - 3 &= 0 \\ x^2 = \frac{3}{2} \\ x_1x_2 = \pm \sqrt{\frac{3}{2}} \end{aligned} $$ 452 861 664 solved problems Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Science, Tech, Math All Science, Tech, Math Humanities All Humanities Languages All Languages Resources All Resources Learning Objectives Identify the terms, the coefficients, and the exponents of a polynomial Evaluate a polynomial for given values of the variable Simplify polynomials by collecting like terms Polynomials are algebraic expressions that are created by combining numbers and variables using arithmetic operations such as addition, subtraction, multiplication, division, and exponentiation. You can create a polynomial by adding or subtracting terms. Polynomials are very useful in applications from science and engineering to business. You may see a resemblance between expressions, which we have been studying in this course, and polynomials. Polynomials are a special sub-group of mathematical expressions and equations. The following table is intended to help you tell the difference between what is a polynomial and what is not. IS a Polynomial Is NOT a Polynomial Because [latex]2x^2-\frac{1}{2}x -9[/latex] [latex]\frac{2}{x^{2}}+x[/latex] Polynomials only have variables in the numerator [latex]\frac{y}{4}-y^3[/latex] [latex]\frac{2}{y}+4[/latex] Polynomials only have variables in the numerator [latex]\sqrt{12}\left(a\right)+9[/latex] [latex]\sqrt{a}+7[/latex] Variables under a root are not allowed in polynomials The basic building block of a polynomial is a monomial. A monomial is one term and can be a number, a variable, or the product of a number and variables with an exponent. The number part of the term is called the coefficient. Examples of monomials: number: [latex]{2}[/latex] variable: [latex]{x}[/latex] product of number and variable: [latex]{2x}[/latex] product of number and variable with an exponent: [latex]{2x}^{3}[/latex] The coefficient can be any real number, including 0. The exponent of the variable must be a whole number—0, 1, 2, 3, and so on. A monomial cannot have a variable in the denominator or a negative exponent. The value of the exponent is the degree of the monomial. Remember that a variable that appears to have no exponent really has an exponent of 1. And a monomial with no variable has a degree of 0. (Since [latex]x^{0}[/latex] has the value of 1 if [latex]xeq0[/latex], a number such as 3 could also be written [latex]3x^{0}[/latex], if [latex]xeq0[/latex] as [latex]3x^{0}=3\cdot1=3[/latex].) A polynomial is a monomial or the sum or difference of two or more polynomials. Each monomial is called a term of the polynomial. Some polynomials have specific names indicated by their prefix. monomial—is a polynomial with exactly one term ("mono"—means one) binomial—is a polynomial with exactly two terms ("bi"—means two) trinomial—is a polynomial with exactly three terms ("tri"—means three) The word "polynomial" has the prefix, "poly," which means many. However, the word polynomial can be used for all numbers of terms, including only one term. Because the exponent of the variable must be a whole number, monomials and polynomials cannot have a variable in the denominator. Polynomials can be classified by the degree of the polynomial. The degree of a polynomial is the degree of its highest degree term. So the degree of [latex]2x^{3}+3x^{2}+8x+5[/latex] is 3. A polynomial is said to be written in standard form when the terms are arranged from the highest degree to the lowest degree. When it is written in standard form it is easy to determine the degree of the polynomial. The table below illustrates some examples of monomials, binomials, trinomials, and other polynomials. They are all written in standard form. Monomials Binomials Trinomials Other Polynomials 15 [latex]3y+13[/latex] [latex]x^{3}-x^{2}+1[/latex] [latex]5x^{4}+3x^{3}-6x^{2}+2x[/latex] [latex]\displaystyle \frac{1}{2}x[/latex] [latex]4p-7[/latex] [latex]3x^{2}+2x-9[/latex] [latex]\frac{1}{3}x^{5}-2x^{4}+\frac{2}{9}x^{3}-x^{2}+4x-\frac{5}{6}[/latex] [latex]-4y^{3}[/latex] [latex]3x^{2}+\frac{5}{8}x[/latex] [latex]3y^{3}+y^{2}-2[/latex] [latex]3t^{3}-3t^{2}-3t-3[/latex] [latex]16n^{4}[/latex] [latex]14y^{3}+3y[/latex] [latex]a^{7}+2a^{5}-3a^{3}[/latex] [latex]q^{7}+2q^{5}-3q^{3}+q[/latex] When the coefficient of a polynomial term is 0, you usually do not write the term at all (because 0 times anything is 0, and adding 0 doesn't change the value). The last binomial above could be written as a trinomial, [latex]14y^{3}+0y^{2}+3y[/latex]. A term without a variable is called a constant term, and the degree of that term is 0. For example 13 is the constant term in [latex]3y+13[/latex]. You would usually say that [latex]14y^{3}+3y[/latex] has no constant term or that the constant term is 0. For the following expressions, determine whether they are a polynomial. If so, categorize them as a monomial, binomial, or trinomial. [latex]\frac{x-3}{1-x}+x^2[/latex] [latex]t^2+2t-3[/latex] [latex]x^3+\frac{x}{8}[/latex] [latex]\frac{\sqrt{y}}{2}-y-1[/latex] In the following video, you will be shown more examples of how to identify and categorize polynomials. Evaluate a polynomial for given values of the variable You can evaluate polynomials just as you have been evaluating expressions all along. To evaluate an expression for a value of the variable, you substitute the value for the variable every time it appears. Then use the order of operations to find the resulting value for the expression. The following video presents more examples of evaluating a polynomial for a given value. Simplify polynomials by collecting like terms Apple and Orange A polynomial may need to be simplified. One way to simplify a polynomial is to combine the like terms if there are any. Two or more terms in a polynomial are like terms if they have the same variable (or variables) with the same exponent. For example, [latex]3x^{2}[/latex] and [latex]-5x^{2}[/latex] are like terms: They both have x as the variable, and the exponent is 2 for each. However, [latex]3x^{2}[/latex] and [latex]3x[/latex] are not like terms, because their exponents are different. Here are some examples of terms that are alike and some that are unlike. Term Like Terms UNLike Terms [latex]a[/latex] [latex]3a, \,\,\,-2a,\,\,\, \frac{1}{2}a[/latex] [latex]a^2,\,\,\,\frac{1}{a},\,\,\, \sqrt{a}[/latex] [latex]a^2[/latex] [latex]-5a^2,\,\,\,\frac{1}{4}a^2,\,\,\, 0.56a^2[/latex] [latex]\frac{1}{a^2},\,\,\,\sqrt{a^2},\,\,\, a^3[/latex] [latex]ab[/latex] [latex]7ab,\,\,\,0.23ab,\,\,\,\frac{2}{3}ab,\,\,\,-ab[/latex] [latex]a^2b,\,\,\,\frac{1}{ab},\,\,\,\sqrt{ab}[/latex] [latex]ab^2[/latex] [latex]4ab^2,\,\,\, \frac{ab^2}{7},\,\,\,0.4ab^2,\,\,\, -a^2b[/latex] [latex]a^2b,\,\,\, ab,\,\,\,\sqrt{ab^2},\,\,\,\frac{1}{ab^2}[/latex] You can use the distributive property to simplify the sum of like terms. Recall that the distributive property of addition states that the product of a number and a sum (or difference) is equal to the sum (or difference) of the products. [latex]2\left(3+6\right)=2\left(3\right)+2\left(6\right)[/latex] Both expressions equal 18. So you can write the expression in whichever form is the most useful. Let's see how we can use this property to combine like terms. You may have noticed that combining like terms involves combining the coefficients to find the new coefficient of the like term. You can use this as a shortcut. When you have a polynomial with more terms, you have to be careful that you combine only like terms. If two terms are not like terms, you can't combine them. Summary Polynomials are algebraic expressions that contain any number of terms combined by using addition or subtraction. A term is a number, a variable, or a product of a number and one or more variables with exponents. Like terms (same variable or variables raised to the same power) can be combined to simplify a polynomial. The polynomials can be evaluated by substituting a given value of the variable into each instance of the variable, then using order of operations to complete the calculations. Calculators :: Polynomial Calculators :: Polynomial Roots Calculator This free math tool finds the roots (zeros) of a given polynomial. The calculator computes exact solutions for quadratic, cubic, and quartic equations. Calculator shows all the work and provides step-by-step on how to find zeros and their multiplicities. Examples Find roots of the polynomial 4x2-10x+4 Find polynomial roots -2x4-x^3+189 Solve equation 6x3-25x3+2x+8=0 Find polynomial roots 2x3-x2-x-3 Find roots 2x4-x4-14x3-6x2+24x+40 Find more worked-out examples in our database of solved problems. Search our database with more than 300 calculators TUTORIAL The process of finding polynomial roots depends on its degree. The degree is the largest exponent in the polynomial. For example, the degree of polynomial p(x)=8x2+3x-1 is 2. We name polynomials according to their degree. For us, the most interesting ones are: quadratic (degree = 2), Cubic (degree=3) and quartic (degree = 4). This is the standard form of a quadratic equation is ax2+bx+c=0 The formula for the roots is $$ x_1, x_2 = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a} $$ Example 01: Solve the equation 2x2+3x-14. In this case we have a=2, b=3, c=-14, so the roots are: $$ \begin{aligned} x_1, x_2 &= \dfrac{-b \pm \sqrt{b^2-4ac}}{2a} \\ x_1, x_2 &= \dfrac{-3 \pm \sqrt{3^2-4 \cdot 2 \cdot (-14)}}{2\cdot2} \\ x_1, x_2 &= \dfrac{-3 \pm \sqrt{9 + 4 \cdot 2 \cdot 14}}{4} \\ x_1, x_2 &= \dfrac{-3 \pm \sqrt{121}}{4} \\ x_1, x_2 &= \dfrac{-3 \pm 11}{4} \\ x_1 &= \dfrac{-3 + 11}{4} = \dfrac{8}{4} = 2 \\ x_2 &= \dfrac{-3 - 11}{4} = \dfrac{-14}{4} = -\dfrac{7}{2} \end{aligned} $$ Sometimes, it is much easier not to use a formula for finding the roots of a quadratic equation. Example 02: Solve the equation 2x2+3x=0. Because our equation now only has two terms, we can apply factoring. Using factoring, we can reduce an original equation to two simple equations. $$ \begin{aligned} 2x^2 + 3x &= 0 \\ \color{red}{x} \cdot \left(\color{blue}{2x + 3} \right) &= 0 \\ \color{red}{x = 0} \,\,\, \color{blue}{2x + 3} & \color{blue}{= 0} \\ \color{blue}{2x } & \color{blue}{= -3} \\ \color{blue}{x} &\color{blue}{= -\frac{3}{2}} \end{aligned} $$ Example 03: Solve equation 2x2-18=0 This is also a quadratic equation that can be solved without using a quadratic formula. 2x2 - 18 = 0 2x2 = 18 x2 = 9 The last equation actually has two solutions. The first one is obvious $$ \color{blue}{x_1 = \sqrt{9} = 3} $$ and the second one is $$ \color{blue}{x_2 = -\sqrt{9} = -3 }$$ To solve a cubic equation, the best strategy is to guess one of three roots. Example 04: Solve the equation 2x3-4x2-3x+6=0. Step 1: Guess one root. The good candidates for solutions are factors of the last coefficient in the equation. In this example, the last number is -6 so our guesses are: 1, 2, 3, 6, -1, -2, -3 and -6 If we plug in x=2into the equation we get, $$ 2 \cdot \color{blue}{2}^3 - 4 \cdot \color{blue}{2}^2 - 3 \cdot \color{blue}{2} + 6 = \\\\ 2 \cdot 8 - 4 \cdot 4 - 6 - 6 = 0$$ So, x=2 is the root of the equation. Now we have to divide polynomial by x-ROOT. In this case we divide 2x3-x2-3x+6 by x-2. (2x3-x2-3x+6)/(x-2) = 2x2-3 Now we use 2x2-3 to find remaining roots $$ \begin{aligned} 2x^2 - 3 &= 0 \\ 2x^2 &= 3 \\ x^2 &= \frac{3}{2} \\ x_1 & = \sqrt{ \frac{3}{2} } = \frac{\sqrt{6}}{2}\\ x_2 &= -\sqrt{ \frac{3}{2} } = - \frac{\sqrt{6}}{2} \end{aligned} $$ To solve cubic equations, we usually use the factoring method. Example 05: Solve equation 2x3-4x2-3x+6=0. Notice that a cubic polynomial has four terms, and the most common factoring method for such polynomials is factoring by grouping. $$ \begin{aligned} & 2x^3 - 4x^2 - 3x + 6 = \\ &=\color{blue}{2x^3-4x^2} \color{red}{-3x + 6} = \\ &= \color{blue}{2x^2(x-2)} \color{red}{-3(x-2)} = \\ &= (x-2)(2x^2 - 3) \end{aligned} $$ Now we can split our equation into two smaller equations, which are much easier to solve. The first one is x-2=0 with a solution x=2, and the second one is 2x2-3=0. $$ \begin{aligned} 2x^2 - 3 &= 0 \\ x^2 = \frac{3}{2} \\ x_1x_2 = \pm \sqrt{\frac{3}{2}} \end{aligned} $$ 452 861 664 solved problems Polynomials are algebraic expressions that include real numbers and variables. Division and square roots cannot be involved in the variables. The variables can only include addition, subtraction, and multiplication. Polynomials contain more than one term. Polynomials are the sums of monomials. A monomial has one term: 5y or -8x2 or 3.A binomial has two terms: -3x2 2, or 9y - 2y2A trinomial has 3 terms: -3x2 2 3x, or 9y - 2y2 y The degree of the term is the exponent of the variable: 3x2 has a degree of 2. When the variable does not have an exponent - always understand that there's a '1' e.g., 1x x2 - 7x - 6 (Each part is a term and x2 is referred to as the leading term.) Term Numerical Coefficient x2-7x-6 1-7-6 8x2 3x -2 Polynomial 8x-3 7y -2 NOT a Polynomial The exponent is negative. 9x2 8x -2/3 NOT a Polynomial Cannot have division. 7xy Monomial Polynomials are usually written in decreasing order of terms. The largest term or the term with the highest exponent in the polynomial is usually written first. The first term in a polynomial is called a leading term. When a term contains an exponent, it tells you the degree of the term. Here's an example of a three-term polynomial: 6x2 - 4xy 2xy: This three-term polynomial has a leading term to the second degree. It is called a second-degree polynomial and often referred to as a trinomial.9x5 - 2x 3x4 - 2: This 4 term polynomial has a leading term to the fifth degree and a term to the fourth degree. It is called a fifth degree polynomial.3x3: This is a one-term algebraic expression that is actually referred to as a monomial. One thing you will do when solving polynomials is combined like terms. Like terms: 6x 3x - 3xNOT like terms: 6xy 2x - 4 The first two terms are like and they can be combined: Thus: Zeros Calculator is an amazing online source that helps you to find the zeros of different functions. You can give any type of function like quadratic, rational, irrational, or cubic in our calculator and it will provide you solution in a couple of minutes. Our zeros of a function calculator can help teachers, tutors, and students easily learn the concepts of zero function in just one click by sitting at home on an online platform. What is the Zeros Function? Zeros function is defined as the function f(x) in which f is the domain and x is the value of variables in polynomials, complex numbers, or vector functions. The zeros function is called the roots of a function because it provides some root in the result that may be real, negative, or complex numbers. Zero function can be achieved when you put f(x)=0 to find the roots of a given function. How Zeros of a Function Calculator Works? Zeros of a polynomial calculator work in the easiest way that can be understandable to everyone. It gives solutions in steps where it breaks down every step of the calculation so that you can handle even a single-step understanding. Steps for Finding Zeros of a Polynomial Step 1: Identify the type of given equation. Step 2: If it is a quadratic equation then solve it by using the formula of a quadratic equation. If it has a higher order of polynomial in a given equation then it uses the synthetic division method or Newton Rapson method to find the root of a given equation. Step 3: Write down all the coefficient values of the given equation and apply the appropriate method according to your equation. Step 4: After adding the value and simplifying the polynomials we get the roots of polynomials or zeros of polynomials as a solution. Note: It should be remembered roots may be positive real numbers, negative real numbers, or complex numbers according to the given function. Solved Example of Zeros Problem: Lets us suppose an example of a zeros function with its solution from the zeros calculator to know its working method practically. Example: Find the Zeros of Polynomial, $$ 2x^2 - 4x - 6 \;=\; 0 $$ Solution: Identify whether the given equation is quadratic. $$ 2x^2 - 4x - 6 \;=\; 0 $$ Compare the given equation with a standard quadratic equation, the coefficient we get, $$ ax^2 + bx + c \;=\; 0 $$ $$ a \;=\; 2, b \;=\; -4\; and\; c \;=\; -6 $$ Apply the quadratic formula and add the values of a, b, and c in this formula. [illegible]

Donald. Jutland Evans Brothers Ltd. 1957; ISBN 0-330-20142-5 ^ Dittmar, F.J & Colledge J.J., British Warships 1914–1919 Ian Allan, London. 1972; ISBN 0-7110-0380-7 ^ Dittmar, F.J & Colledge J.J., British Warships 1914–1919 Ian Allan, London. 1972; ISBN 0-7110-0380-7 pp20 ^ Dittmar, F.J & Colledge J.J., British Warships 1914–1919 Ian Allan, London. 1972; ISBN 0-7110-0380-7 pp24 ^ Orbat.com/Niehorster, Mediterranean Fleet, 3 September 1939, accessed May 2008 ^ Jackson, Ashley (2006). The British Empire and the Second World War. Continuum International Publishing Group. p. 301. ISBN 1-85285-417-0. ^ "Royal Navy Senior Appointments" (PDF). Archived from the original (PDF) on 11 July 2011. Retrieved 4 October 2014. ^ Harley, Simon; Lovell, Tony. "First Battle Squadron (Royal Navy) - The Dreadnought Project". www.dreadnoughtproject.org. Harley and Lovell, 27 December 2016. Retrieved 15 February 2018. First Battle Squadron at DreadnoughtProject.org Royal Navy History Composition of the Grand Fleet Retrieved from " 3 The following pages link to 1st Battle Squadron External tools (link count transclusion count sorted list) · See help page for transcluding these entries Showing 50 items. View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)List of dreadnought battleships of the Royal Navy (links | edit) Revenge-class battleship (links | edit) HMS King Edward VII (links | edit) HMS Glorious (links | edit) HMS Revenge (06) (links | edit) HMS Resolution (09) (links | edit) HMS Royal Oak (08) (links | edit) Renown-class battlecruiser (links | edit) HMS Renown (1916) (links | edit) HMS Repulse (1916) (links | edit) HMS Emperor of India (links | edit) British Pacific Fleet (links | edit) HMS New Zealand (1911) (links | edit) Courageous-class battlecruiser (links | edit) 5th Battle Squadron (links | edit) HMS Agincourt (1913) (links | edit) HMS Africa (1905) (links | edit) Mediterranean Fleet (links | edit) Hugh Evan-Thomas (links | edit) Henry Harwood (links | edit) HMS Britannia (1904) (links | edit) List of fleets and major commands of the Royal Navy (links | edit) HMS Hibernia (1905) (links | edit) Reginald Drax (links | edit) HMS Southampton (1912) (links | edit) Atlantic Fleet (United Kingdom) (links | edit) HMS Commonwealth (links | edit) Boadicea-class cruiser (links | edit) Sir Charles Madden, 1st Baronet (links | edit) HMS Hindustan (1903) (links | edit) Tondern raid (links | edit) 6th Battle Squadron (links | edit) British 1st Battle Squadron (redirect page) (links | edit) Henry Pridham-Wippell (links | edit) HMS Gloucester (1909) (links | edit) HMS Dominion (links | edit) HMS Zealandia (links | edit) HMS Bellona (1909) (links | edit) Main Page (links | edit) 2nd Battle Squadron (links | edit) 3rd Battle Squadron (links | edit) 4th Battle Squadron (links | edit) Action off Cape Passero (links | edit) 701 Naval Air Squadron (links | edit) Henry Bruce (Royal Navy officer) (links | edit) 9th Battle Squadron (links | edit) David Norris (Royal Navy officer) (links | edit) Ralph Leatham (links | edit) Rudolph Bentinck (links | edit) Bernard Rawlings (Royal Navy officer) (links | edit) View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500) Retrieved from " WhatLinksHere/1st_Battle_Squadron"