CALCULUS AND THE DERIVE PROGRAM pdf

1: Calculus - Wikipedia

This program graphs the slope field of a derivative, a technique used in calculus for many purposes. It asks for dy/dx (the derivative) and it graphs a line segment at a specified number of points, each having the slope as denoted by the derivative.

An extremely well-written book for students taking Calculus for the first time as well as those who need a refresher. Differentiation variable and more can be changed in "Options". The result will be shown further below. How the Derivative Calculator Works For those with a technical background, the following section explains how the Derivative Calculator works. First, a parser analyzes the mathematical function. It transforms it into a form that is better understandable by a computer, namely a tree see figure below. In doing this, the Derivative Calculator has to respect the order of operations. The Derivative Calculator has to detect these cases and insert the multiplication sign. The parser is implemented in JavaScript , based on the Shunting-yard algorithm , and can run directly in the browser. This allows for quick feedback while typing by transforming the tree into LaTeX code. MathJax takes care of displaying it in the browser. This time, the function gets transformed into a form that can be understood by the computer algebra system Maxima. Maxima takes care of actually computing the derivative of the mathematical function. Like any computer algebra system, it applies a number of rules to simplify the function and calculate the derivatives according to the commonly known differentiation rules. Instead, the derivatives have to be calculated manually step by step. The rules of differentiation product rule, quotient rule, chain rule, â€¦ have been implemented in JavaScript code. There is also a table of derivative functions for the trigonometric functions and the square root, logarithm and exponential function. In each calculation step, one differentiation operation is carried out or rewritten. For example, constant factors are pulled out of differentiation operations and sums are split up sum rule. This, and general simplifications, is done by Maxima. For each calculated derivative, the LaTeX representations of the resulting mathematical expressions are tagged in the HTML code so that highlighting is possible. Their difference is computed and simplified as far as possible using Maxima. If it can be shown that the difference simplifies to zero, the task is solved. Otherwise, a probabilistic algorithm is applied that evaluates and compares both functions at randomly chosen places. The interactive function graphs are computed in the browser and displayed within a canvas element HTML5. For each function to be graphed, the calculator creates a JavaScript function, which is then evaluated in small steps in order to draw the graph. While graphing, singularities e. The gesture control is implemented using Hammer.

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2: Lesson: The Derivative | Calculus | Math Tutor Inc.

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History of calculus Modern calculus was developed in 17th-century Europe by Isaac Newton and Gottfried Wilhelm Leibniz independently of each other, first publishing around the same time but elements of it appeared in ancient Greece, then in China and the Middle East, and still later again in medieval Europe and in India. Ancient[edit] Archimedes used the method of exhaustion to calculate the area under a parabola. The ancient period introduced some of the ideas that led to integral calculus, but does not seem to have developed these ideas in a rigorous and systematic way. Calculations of volume and area , one goal of integral calculus, can be found in the Egyptian Moscow papyrus 13th dynasty , c. He used the results to carry out what would now be called an integration of this function, where the formulae for the sums of integral squares and fourth powers allowed him to calculate the volume of a paraboloid. Madhava of Sangamagrama and the Kerala School of Astronomy and Mathematics thereby stated components of calculus. A complete theory encompassing these components is now well known in the Western world as the Taylor series or infinite series approximations. I think it defines more unequivocally than anything else the inception of modern mathematics, and the system of mathematical analysis, which is its logical development, still constitutes the greatest technical advance in exact thinking. Pierre de Fermat , claiming that he borrowed from Diophantus , introduced the concept of adequality , which represented equality up to an infinitesimal error term. Isaac Newton developed the use of calculus in his laws of motion and gravitation. The product rule and chain rule , [15] the notions of higher derivatives and Taylor series , [16] and of analytic functions [citation needed] were introduced by Isaac Newton in an idiosyncratic notation which he used to solve problems of mathematical physics. In his works, Newton rephrased his ideas to suit the mathematical idiom of the time, replacing calculations with infinitesimals by equivalent geometrical arguments which were considered beyond reproach. He used the methods of calculus to solve the problem of planetary motion, the shape of the surface of a rotating fluid, the oblateness of the earth, the motion of a weight sliding on a cycloid , and many other problems discussed in his Principia Mathematica In other work, he developed series expansions for functions, including fractional and irrational powers, and it was clear that he understood the principles of the Taylor series. He did not publish all these discoveries, and at this time infinitesimal methods were still considered disreputable. Gottfried Wilhelm Leibniz was the first to state clearly the rules of calculus. These ideas were arranged into a true calculus of infinitesimals by Gottfried Wilhelm Leibniz , who was originally accused of plagiarism by Newton. His contribution was to provide a clear set of rules for working with infinitesimal quantities, allowing the computation of second and higher derivatives, and providing the product rule and chain rule , in their differential and integral forms. Unlike Newton, Leibniz paid a lot of attention to the formalism, often spending days determining appropriate symbols for concepts. Today, Leibniz and Newton are usually both given credit for independently inventing and developing calculus. Newton was the first to apply calculus to general physics and Leibniz developed much of the notation used in calculus today. The basic insights that both Newton and Leibniz provided were the laws of differentiation and integration, second and higher derivatives, and the notion of an approximating polynomial series. When Newton and Leibniz first published their results, there was great controversy over which mathematician and therefore which country deserved credit. Newton derived his results first later to be published in his Method of Fluxions , but Leibniz published his " Nova Methodus pro Maximis et Minimis " first. Newton claimed Leibniz stole ideas from his unpublished notes, which Newton had shared with a few members of the Royal Society. This controversy divided English-speaking mathematicians from continental European mathematicians for many years, to the detriment of English mathematics. It is Leibniz, however, who gave the new discipline its name. Newton called his calculus " the science of fluxions ". Since the time of Leibniz and Newton, many mathematicians have contributed to the continuing development of calculus. One of the first and most complete works on both

infinitesimal and integral calculus was written in by Maria Gaetana Agnesi. In early calculus the use of infinitesimal quantities was thought unrigorous, and was fiercely criticized by a number of authors, most notably Michel Rolle and Bishop Berkeley. Berkeley famously described infinitesimals as the ghosts of departed quantities in his book The Analyst in Working out a rigorous foundation for calculus occupied mathematicians for much of the century following Newton and Leibniz, and is still to some extent an active area of research today. Several mathematicians, including Maclaurin , tried to prove the soundness of using infinitesimals, but it would not be until years later when, due to the work of Cauchy and Weierstrass , a way was finally found to avoid mere "notions" of infinitely small quantities. Following the work of Weierstrass, it eventually became common to base calculus on limits instead of infinitesimal quantities, though the subject is still occasionally called "infinitesimal calculus". Bernhard Riemann used these ideas to give a precise definition of the integral. It was also during this period that the ideas of calculus were generalized to Euclidean space and the complex plane. In modern mathematics, the foundations of calculus are included in the field of real analysis , which contains full definitions and proofs of the theorems of calculus. The reach of calculus has also been greatly extended. Henri Lebesgue invented measure theory and used it to define integrals of all but the most pathological functions. Laurent Schwartz introduced distributions , which can be used to take the derivative of any function whatsoever. Limits are not the only rigorous approach to the foundation of calculus. The resulting numbers are called hyperreal numbers , and they can be used to give a Leibniz-like development of the usual rules of calculus. There is also smooth infinitesimal analysis , which differs from non-standard analysis in that it mandates neglecting higher power infinitesimals during derivations. Significance[edit] While many of the ideas of calculus had been developed earlier in Greece , China , India , Iraq, Persia , and Japan , the use of calculus began in Europe, during the 17th century, when Isaac Newton and Gottfried Wilhelm Leibniz built on the work of earlier mathematicians to introduce its basic principles. The development of calculus was built on earlier concepts of instantaneous motion and area underneath curves. Applications of differential calculus include computations involving velocity and acceleration , the slope of a curve, and optimization. Applications of integral calculus include computations involving area, volume , arc length , center of mass , work , and pressure. More advanced applications include power series and Fourier series. Calculus is also used to gain a more precise understanding of the nature of space, time, and motion. For centuries, mathematicians and philosophers wrestled with paradoxes involving division by zero or sums of infinitely many numbers. These questions arise in the study of motion and area. The ancient Greek philosopher Zeno of Elea gave several famous examples of such paradoxes. Calculus provides tools, especially the limit and the infinite series , that resolve the paradoxes.

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3: Derive - Download

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These applications will let you do everything from simple arithmetic to solving complicated formulas. They specialize in business math but can be coaxed into doing science and engineering computations. Derive may cost more than a shareware math program, but the return on your investment will pay off. There are also worldwide, user groups to provide additional support should you need it. Whereas other companies have abandoned the DOS platform, Derive continues to support this operating system. The company has continually upgraded its flagship product since then. The technology developed by SoftWarehouse has been incorporated into the latest graphing calculators from Texas Instrument: Some calculator users have claimed that the TI 92 Plus is the equivalent of the HP 48 calculator with all the add-in applications already built in. Recently, Texas Instruments purchased SoftWarehouse but the parent company still sells and supports Derive. What Does Derive Do? This means that it is, first and foremost, a symbolic math program. All these programs work with numbers but they are really designed to manipulate symbols. With Derive, you can key in a math formula just as it appears in print and the program will rearrange and solve the formula for one variable in terms of the others. This is something that people learn to do in their first algebra course. It can present solutions symbolically, graphically or numerically. Number Crunching Extended precision results are one of the features that Derive users notice almost immediately. Granted, you could use Derive to add a column of numbers but that would be like using a baseball bat to kill a mosquito. Note that the result is shown as a rational number a numerator divided by a denominator. Derive can also give you the decimal approximation with as much precision as you could want. Working With Matrices and Vectors Anyone who has taken a linear algebra course knows that finding determinants of matrices larger than 3x3 is a pain. Most graphing calculators will allow you to input a numeric matrix and find the determinant automatically. Derive handles this quite well, of course. But in addition, Derive allows you to do operations on symbolic matrices as well. Screen 1 shows a symbolic matrix determinant. Rather than going through a complicated process of finding 2x2 determinants by hand, you can have it solved in 0. For trigonometry, Derive is excellent. Screen 2 shows some of the trigonometric identities that Derive has built-in, and how it can simplify them symbolically. This particular example was solved in 0. For calculus, Derive is like walking around with a differential and integral text reference. Derive can solve most of the integrals in the CRC Handbook tables. For the early calculus subjects: Derive can be a great learning tool. Screen 3 shows three different examples: Notice that Derive can take limits from either direction or both directions. All of the above examples simplify in under two seconds. Screen 4 shows how Derive handles complex definite integrals. Notice that, in this example, one of the limits of integration is infinity. Derive can handle it just fine and presents the result in a very readable format. The above integral took only 0. Without a symbolic math program, this integral would probably have to be looked up in an integral table such as Gradshteyn and Ryshik. Screen 5 shows that Derive can also do symbolic indefinite integrals. To solve this without Derive you would have to use several rules of integration: I typed in the integral, shown on the left of the equal sign in Screen 5, and asked Derive to solve it. My double speed Palmtop gave me the solution, shown on the right of the equal sign, 3. Derive can also do fantastic plots in either two or three dimensions. Screen 6 shows a 2D, implicit, circle plot on the LX: Screen 8 shows what can be done on a VGA monitor. On the Palmtop, despite the more modest graphics capabilities, 3D plots can still be drawn. They just take more time. You can define custom formulas and functions somewhat like you can do in the HP Solver application. This allows expansion of the capabilities of Derive so you can do even more powerful calculations. For example, Screen 9 shows a second-order differential equation that was solved by functions in the ODE. Derive will also do unit calculations and can handle your own custom-defined units. If you have a need to convert kilometers per hour to apples per oranges, you can define such a conversion in Derive without any problem. Derive can be run in either graphics or text mode, depending on your preference. Text mode is faster, especially when plotting, but obviously shows far less detail than graphs. You can use

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Derive to build complicated expressions and then import them, ready-made, into your programs. The latest version of Derive, 4. The new version offers several new functions beyond those in previous versions. However, the most important new feature is that you can run Derive on either a 16 bit Palmtop or a 32 bit Windows machine and you only need one executable file. This eliminates the need for the two separate executables that the previous versions used. Speedwise, the new version seems about the same as the 3. For a complete list of new features, see http:

4: TI/84 Plus BASIC Math Programs (Calculus) - www.enganchecubano.com

A Calculus of Functions for Program Derivation. R.S. Bird Programming Research Group, Oxford University.! 1. Introduction. This paper is about how to calculate programs.

5: Calculus Learning Software | Math Tutor Inc.

programs were written such as Derive, Mathematica and www.enganchecubano.com- puter calculus labs were created at most universities and colleges to take advantage of this new technology and to start experimenting with new ideas.

6: - Every Step Calculus

Chapter 0 Introduction and Derive Basics Overview In this course you will learn to use the computer mathematics program De-rive. This program, along with others such as Maple and Mathematica.

7: Derive: The Mathematical Assistant

Derive: The Mathematical Assistant This commercial, math program will satisfy the math-lust of almost any Palmtopper. By David Sargeant For most users, the HP Palmtop's Lotus and HP Calc programs provide more than enough number crunching power.

8: Derive (computer algebra system) - Wikipedia

Derive 6 was a powerful system for doing symbolic and numeric mathematics on your PC.. It processed algebraic variables, expressions, equations, functions, vectors, matrices and Boolean expressions like a scientific calculator processes numbers.

9: Derivative Calculator â€¢ With Steps!

In this activity, students explore information about a graph based on the first and second derivatives. They learn that a function's derivative is positive when the function increases and negative when the function decreases.

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The pre-Reformation English Bible (1) The garden of forking paths analysis Hagure yuusha no kichiku bigaku light novel Action focused assessment for software process improvement Popes digest, 1815. Ieee papers on power electronics Another roadside attraction by tom robbins Best offline standing er Armed separatist insurgencies Multiple regression analysis formula Mr. Hambles bear. The Show Down in St. Augustine Democracy and the political unconscious A theory of counter-terrorism policing Outlaws, Renegades and Saints Hopkins in the age of Darwin Venus Williams (Ovations (Ovations) While bullets fly Lingering impressions : does ADHD matter in the long term? The Beauties of Shakespear: Regularly Selected from Each Play. With a . Ladies of the evening Martina Navratilova Encyclopedia of Modern American Extremists and Extremist Groups: Dude, got another joke? House of night fledgling handbook 101 Uneasy States of Grace The changing face of Arab communications Muhammad I. Ayish Tools for linking choices with consequences Dave Biggs . [et al.] Are you having sex for fun and babies? Blue jays 2017 schedule Enhancing prisoners coping skills Greg E. Dear . et al.] Soviet aims in Central America Sapiential perspectives Amos vogel as a subversive art The prairie riders Treatment approaches with suicidal adolescents Utilizing rehabilitation facilities and support services Structural analysis kassimali 5th edition Getting Started With English Language Learners Annotated constitution and canons Winnicott and the Psychoanalytic Tradition