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Calculus

Addison-Wesley. p. 203. ISBN 978-0-321-38700-4. Zill, Dennis G.; Wright, Scott; Wright, Warren S. (2009). Calculus: Early Transcendentals (3rd ed.). Jones &

Calculus is the mathematical study of continuous change, in the same way that geometry is the study of shape, and algebra is the study of generalizations of arithmetic operations.

Originally called infinitesimal calculus or "the calculus of infinitesimals", it has two major branches, differential calculus and integral calculus. The former concerns instantaneous rates of change, and the slopes of curves, while the latter concerns accumulation of quantities, and areas under or between curves. These two branches are related to each other by the fundamental theorem of calculus. They make use of the fundamental notions of convergence of infinite sequences and infinite series to a well-defined limit. It is the "mathematical backbone" for dealing

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with problems where variables change with time or another...

History of calculus

ISBN 978-0-7923-3463-7., Chapter, p. 279 Zill, Dennis G.; Wright, Scott; Wright, Warren S. (2009). Calculus: Early Transcendentals (3 ed.). Jones & Bartlett

Calculus, originally called infinitesimal calculus, is a mathematical discipline focused on limits, continuity, derivatives, integrals, and infinite series. Many elements of calculus appeared in ancient Greece, then in China and the Middle East, and still later again in medieval Europe and in India. Infinitesimal calculus was developed in the late 17th century by Isaac Newton and Gottfried Wilhelm Leibniz independently of each other. An argument over priority led to the Leibniz-Newton calculus controversy which continued until the death of Leibniz in 1716. The development of calculus and its uses within the sciences have continued to the present.

Mathematical analysis

Journal of History of Science. 48: 291-313. Zill, Dennis G.; Wright, Scott; Wright, Warren S. (2009). Calculus: Early Transcendentals (3 ed.). Jones & Bartlett

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Analysis is the branch of mathematics dealing with continuous functions, limits, and related theories, such as differentiation, integration, measure, infinite sequences, series, and analytic functions.

These theories are usually studied in the context of real and complex numbers and functions. Analysis evolved from calculus, which involves the elementary concepts and techniques of analysis.

Analysis may be distinguished from geometry; however, it can be applied to any space of mathematical objects that has a definition of nearness (a topological space) or specific distances between objects (a metric space).

Mathematics education in the United States

Pre-calculus, and Calculus or Statistics. Some students enroll in integrated programs while many complete high school without taking Calculus or Statistics

Mathematics education in the United States varies considerably from one state to the next, and even within a single state. With the adoption of the Common Core Standards in most states and

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the District of Columbia beginning in 2010, mathematics content across the country has moved into closer agreement for each grade level. The SAT, a standardized university entrance exam, has been reformed to better reflect the contents of the Common Core.

Many students take alternatives to the traditional pathways, including accelerated tracks. As of 2023, twenty-seven states require students to pass three math courses before graduation from high school (grades 9 to 12, for students typically aged 14 to 18), while seventeen states and the District of Columbia require four. A typical sequence of secondary...

Ordinary differential equation

these solutions he opened a field worked by various writers, notably Casorati and Cayley. To the latter is due (1872) the theory of singular solutions of

In mathematics, an ordinary differential equation (ODE) is a differential equation (DE) dependent on only a single independent variable. As with any other DE, its unknown(s) consists of one (or more) function(s) and involves the derivatives of those functions. The term "ordinary" is used in contrast with partial differential equations (PDEs) which may be with respect to more than one independent variable, and, less commonly, in contrast with stochastic differential equations

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(SDEs) where the progression is random.

History of mathematics

(Berggren, Borwein & Borwein 2004, pp. 20, 24-26) Zill, Dennis G.; Wright, Scott; Wright, Warren S. (2009). Calculus: Early Transcendentals (3 ed.). Jones & Bartlett

The history of mathematics deals with the origin of discoveries in mathematics and the mathematical methods and notation of the past. Before the modern age and worldwide spread of knowledge, written examples of new mathematical developments have come to light only in a few locales. From 3000 BC the Mesopotamian states of Sumer, Akkad and Assyria, followed closely by Ancient Egypt and the Levantine state of Ebla began using arithmetic, algebra and geometry for taxation, commerce, trade, and in astronomy, to record time and formulate calendars.

The earliest mathematical texts available are from Mesopotamia and Egypt - Plimpton 322 (Babylonian c. 2000 - 1900 BC), the Rhind Mathematical Papyrus (Egyptian c. 1800 BC) and the Moscow Mathematical Papyrus (Egyptian c. 1890 BC). All these texts mention...

Complex number

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ISBN 978-0-12-394784-0. Extract of page 570 Dennis Zill; Jacqueline Dewar (2011). Precalculus with Calculus Previews: Expanded Volume (revised ed.). Jones

In mathematics, a complex number is an element of a number system that extends the real numbers with a specific element denoted i , called the imaginary unit and satisfying the equation

i

2

$=$

$-$

1

$$\{\displaystyle i^2=-1\}$$

; every complex number can be expressed in the form

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a

+

b

i

$\{\displaystyle a+bi\}$

, where a and b are real numbers. Because no real number satisfies the above equation, i was called an imaginary number by René Descartes. For the complex number

a

+

b

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i

$$\{ \displaystyle a+bi \}$$

, a is called the real part, and b is called the imaginary...

Cross product

Wilson 1901, p. 60–61. Dennis G. Zill; Michael R. Cullen (2006). "Definition 7.4: Cross product of two vectors". Advanced engineering mathematics (3rd ed

In mathematics, the cross product or vector product (occasionally directed area product, to emphasize its geometric significance) is a binary operation on two vectors in a three-dimensional oriented Euclidean vector space (named here

E

$$\{ \displaystyle E \}$$

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), and is denoted by the symbol

$\times$

$\{\displaystyle \times \}$

. Given two linearly independent vectors a and b , the cross product, $a \times b$ (read "a cross b"), is a vector that is perpendicular to both a and b , and thus normal to the plane containing them. It has many applications in mathematics, physics, engineering, and computer programming. It should not be confused with the dot product (projection product).

The magnitude of the cross product equals the area of...

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