

Glossary

Daily compounding In the compound interest formula, it is when $n = 365$ (exact interest) or when $n = 360$ (ordinary interest). In this book, use ordinary interest unless otherwise indicated.

Data processing The recording and handling of information by means of mechanical or electronic equipment.

Database A collection of information. A data-base manager is a program that is in charge of the information stored in a database.

Database manager A computer program that allows a user to interface with a database.

Dealer's cost The actual amount that a dealer pays for the goods sold.

Debug The organized process of testing for, locating, and correcting errors within a program.

Decagon A polygon having ten sides.

Decay formula Refers to exponential decay. It is described by the equation

$$A = A_0e^{rt}$$

where r is the annual decay rate (and consequently is negative), t is the time (in years), A_0 is the amount present initially (present value), and A is the future value. If r is positive, this formula models growth, and if r is negative, the formula models decay.

Deci- A prefix that means 1/10.

Decibel A unit of measurement for measuring sounds. It is defined as a ratio of the intensity of one sound, I , and another sound $I_0 \approx 10^{-16}$ watt/cm², the intensity of a barely audible sound for a person with normal hearing.

Deciles Nine values that divide a data set into ten equal parts.

Decimal Any number written in decimal notation. The digits represent powers of ten with whole numbers and fractions being separated by a period, called a *decimal point*. Sometimes called a Hindu-Arabic numeral.

Decimal fraction A number in decimal notation that has fractional parts, such as 23.25. If a common fraction p/q is written as a decimal fraction, the result will be either a *terminating decimal* as with $\frac{1}{4} = 0.25$ or a *repeating decimal* as with $\frac{2}{3} = 0.6666\cdots$.

Decimal notation The representation of a number using the decimal number system. See *Decimal*.

Decimal numeration system A numeration system with base 10.

Decimal point See *Decimal*.

Decisiveness Given any set of individual rankings, the method produces a winner when voting.

Decoding key A key that allows one to unscramble a coded message.

Deductive reasoning A formal structure based on a set of axioms and a set of undefined terms. New terms are defined in terms of the given undefined terms and new statements, or *theorems*, are derived from the axioms by proof.

Definite integral Let f be a function defined over the interval $[a, b]$. Then the definite integral of f over the interval is denoted by

$$\int_a^b f(x) dx$$

and is the net change of an antiderivative of f over that interval. Thus, if $F(x)$ is an antiderivative of $f(x)$, then

$$\int_a^b f(x) dx = F(x)|_a^b = F(b) - F(a)$$

Degree (1) The degree of a term in one variable is the exponent of the variable, or it is the sum of the exponents of the variables if there are more than one. The degree of a polynomial is the degree of its highest-degree term. (2) A unit of measurement of an angle that is equal to $1/360$ of a revolution.

Deka- A prefix that means 10.

Deleted point A single point that is excluded from the domain.

De Morgan's laws For sets X and Y ,

$$\overline{X \cup Y} = \overline{X} \cap \overline{Y}$$

and

$$\overline{X \cap Y} = \overline{X} \cup \overline{Y}$$

Demand The number of items that can be sold at a given price.

Denominator See *Rational number*.

Dense set A set of numbers with the property that between any two points of the set, there exists another point in the set that is between the two given points.

Denying the antecedent A logical fallacy; same as the *fallacy of the inverse*.

Denying the consequent Same as *indirect reasoning*.

Dependent events Two events are dependent if the occurrence of one influences the probability of the occurrence of the other.

Dependent system If *every* ordered pair satisfying one equation in a system of equations also satisfies every other equation of the given system, then we describe the system as dependent.

Dependent variable The variable associated with the second component of an ordered pair.

Derivative One of the fundamental operations of calculus; it is the instantaneous rate of change of a function with respect to the variable. Formally, for a given function f , we define the derivative of f at x , denoted by $f'(x)$, to be

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

provided this limit exists. If the limit exists, we say f is a differentiable function of x .

Description method A method of defining a set by describing the set (as opposed to listing its elements).

Descriptive statistics Statistics that is concerned with the accumulation of data, measures of central tendency, and dispersion.

Diagonal form A matrix with the terms arranged on a diagonal, from upper left to lower right, and zeros elsewhere.

Diameter See *Circle*.

Dice Plural for the word *die*, which is a small, marked cube used in games of chance.

Dictatorship A selection process where one person alone makes a decision.

Die See *Dice*.

Difference The result of a subtraction.

Difference quotient If f is a function, then the *difference quotient* is defined to be the function

$$\frac{f(x+h) - f(x)}{h}$$

Difference of squares A mathematical expression in the form $a^2 - b^2$.

Differentiable function See *Derivative*.

Differential calculus That branch of calculus that deals with the derivative and applications of the derivative.

Dimension (1) A configuration having length only is said to be of one dimension; area and not volume, two dimensions; volume, three dimensions. (2) In reference to matrices, dimension is the numbers of rows and columns.

Direct reasoning One of the principal forms of logical reasoning. It is an argument of the form

$$[(p \rightarrow q) \wedge p] \rightarrow q$$

Directrix See *Parabola*.

Discount A reduction from a usual or list price.

Discrete mathematics That part of mathematics that deals with sets of objects that can be counted or processes that consist of a sequence of individual steps.

Disjoint sets Sets that have no elements in common.

Disjunction The disjunction of two simple statements p and q is false whenever both p and q are false, and is true otherwise. The common translation of disjunction is "or."

Disk drive A mechanical device that uses the rotating surface of a magnetic disk for the high-speed transfer and storage of data.

Distinguishable permutation The number of distinguishable permutations of n objects in which n_1 are of one kind, n_2 are of another kind, \dots , and n_k are of a further kind, so that $n = n_1 + n_2 + \dots + n_k$ is denoted by

$$\binom{n}{n_1, n_2, \dots, n_k}$$

$$\binom{n}{n_1, n_2, \dots, n_k} = \frac{n!}{n_1! n_2! \cdot \dots \cdot n_k!}$$

Distributive law of exponents

$$(1) (ab)^m = a^m b^m; \quad (2) \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Distributive property (for multiplication over addition) If a , b , and c are real numbers, then $a(b + c) = ab + ac$ and $(a + b)c = ac + bc$ for the basic operations. That is, the number outside the parentheses indicating a sum or difference is distributed to each of the numbers inside the parentheses.

Diverge A sequence that does not converge is said to diverge.

Dividend The number or quantity to be divided. In a/b , the dividend is a .

Divides See *Divisibility*.

Divine proportion If two lengths h and w satisfy the proportion

$$\frac{h}{w} = \frac{w}{h + w}$$

then the lengths are said to be in a *divine proportion*.

Divisibility If m and d are counting numbers, and if there is a counting number k so that $m = d \cdot k$, we say that d is a divisor of m , d is a factor of m , d divides m , and m is a multiple of d .

Division $\frac{a}{b} = x$ is $a \div b = x$ and means $a = bx$.

Division by zero In the definition of division, $b \neq 0$, because if $b = 0$, then $bx = 0$, regardless of the value of x . If $a \neq 0$, then there is no such number. On the other hand, if $a = 0$, then $0/0 = 1$ checks from the definition, and so also does $0/0 = 2$, which means that $1 = 2$, another contradiction. Thus, division by 0 is excluded.

Division of integers The quotient of two integers is the quotient of the absolute values, and is positive if the given integers have the same sign, and negative if the given numbers have opposite signs. Furthermore, division by zero is not possible and division into 0 gives the answer 0.

Division of rational numbers

$$\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc} \quad (c \neq 0)$$

Division property (of equations) The solution of an equation is unchanged by dividing both sides of the equation by the same nonzero number.

Division property of inequality See *Multiplication property of inequality*.

Divisor The quantity by which the dividend is to be divided. In a/b , b is the divisor.

Dodecagon A polygon with 12 sides.

Domain The *domain* of a variable is the set of replacements for the variable. The *domain* of a graph of an equation with two variables x and y is the set of permissible real-number replacements for x .

Double negative $-(-a) = a$

Double subscripts Two subscripts on a variable as in a_{12} . (Do not read this as "twelve.")

Down payment An amount paid at the time a product is financed. The purchase price minus the down payment is equal to the amount financed.

Download The process of copying a program from the network to your computer.

Dummy variable A variable in a mathematical expression whose only function is as a placeholder.