

Glossary

Identity (1) A statement of equality that is true for all values of the variable. It also refers to a number I so that for some operation \circ , $I \circ a = a \circ I = a$ for every number a in a given set. (2) An open equation that is true for all replacements of the variable.

Identity matrix A matrix satisfying the identity property. It is a square matrix consisting of ones along the main diagonal and zeros elsewhere.

If-then In symbolic logic, it is a connective also called *implication*.

Implication A statement that follows from other statements. It is also a proposition formed from two given propositions by connecting them with an “if \dots , then \dots ” form. It is symbolized by $p \rightarrow q$.

Impossible event An event for which the probability is zero — that is, an event that cannot happen.

Improper fraction A fraction for which the numerator is greater than the denominator.

Improper subset See *Subset*.

Inch A linear measurement in the United States system equal in length to the following segment:

Inclusive or This is the same as *disjunction*. The compound statement “ p or q ” is called the *inclusive or*.

Inconsistent system A system for which no replacements of the variable make the equations true simultaneously.

Indefinite integral An antiderivative.

Independence of irrelevant alternatives If a voter prefers A to B with C as a possible choice, we assume that the voter still prefers A to B when C is not a possible choice.

Independent events Events E and F are *independent* if the occurrence of one in no way affects the occurrence of the other.

Independent system A system of equations such that no one of them is necessarily satisfied by a set of values of the variables that satisfy all the others.

Independent variable The variable associated with the first component of an ordered pair.

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

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

Inductive reasoning A type of reasoning accomplished by first observing patterns and then predicting answers for more complicated similar problems.

Inequality A statement of order. If always true, an inequality is called an *absolute inequality*; if always false, an inequality is called a *contradiction*. If sometimes true and sometimes false, it is called a *conditional inequality*. Values that make the statement true are said to satisfy the inequality. A *string of inequalities* may be used to show the order of three or more quantities.

Inequality symbols The symbols $>$, \geq , $<$, and \leq . Also called *order symbols*.

Inferential statistics Statistics that is concerned with making generalizations or predictions about a population based on a sample from that population.

Infinite series The indicated sum of an infinite sequence.

Infinite set See *Set*.

Infinity symbol ∞

Inflation An increase in the amount of money in circulation, resulting in a fall in its value and a rise in prices. In this book, we assume annual compounding with the future value formula; that is, use $A = P(1 + r)^n$, where r is the projected annual inflation rate, n is the number of years, and P is the present value.

Information retrieval The locating and displaying of specific material from a description of its content.

Input A method of putting information into a computer. *Input* includes downloading a program, typing on a keyboard, pressing on a pressure-sensitive screen.

Input device Component of a system that allows the entry of data or a program into a computer's memory.

Installment loan A financial problem in which an item is paid for over a period of time. It is calculated using add-on interest or compound interest.

Installments Part of a debt paid at regular intervals over a period of time.

Instant Insanity A puzzle game consisting of four blocks with different colors on the faces. The object of the game is to arrange the four blocks in a row so that no color is repeated on one side as the four blocks are rotated through 360° .

Instantaneous rate of change The instantaneous rate of change of a function f from x to $x + h$ is

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

Integers $\mathbb{Z} = \{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$, composed of the natural numbers, their opposites, and 0.

Integral A fundamental concept of calculus, which involves finding the area bounded by a curve, the x -axis, and two vertical lines. 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. The numbers a and b are called the *limits of integration*.

Integral calculus That branch of calculus that involves applications of the integral.

Integral of a sum It is the following property of integrals:

$$\int [f(x) + g(x)] dx = \int f(x) dx + \int g(x) dx$$

Integrand In an integral it is the function to be integrated.

Integrated circuit The plastic or ceramic body that contains a chip and the leads connecting it to other components.

Interactive Software that allows continuous two-way communication between the user and the program.

Intercept form of the equation of a line The form

$$\frac{x}{a} + \frac{y}{b} = 1$$

of a linear equation where the x -intercept is a and the y -intercept is b .

Intercepts The point or points where a line or a curve crosses a coordinate axis. The x -intercepts are sometimes called the *zeros* of the equation.

Interest An amount of money paid for the use of another's money. See *Compound interest*.

Interest-only loan A loan in which periodic payments are for interest only so that the principal amount of the loan remains the same.

Interest rate The percentage rate paid on financial problems. In this book it is denoted by r and is assumed to be an annual rate unless otherwise stated.

Interface The electronics necessary for a computer to communicate with a peripheral.

Internet A network of computers from all over the world that are connected together.

Intersection The *intersection* of sets A and B , denoted by $A \cap B$, is the set consisting of elements in *both* A and B .

Interval See *Classes*.

Invalid argument An argument that is not valid.

Inverse (1) In symbolic logic, for an implication $p \rightarrow q$, the inverse is the statement $\sim p \rightarrow \sim q$. (2) For addition, see *Opposites*. For multiplication, see *Reciprocal*. (3) For matrices, if $[A]$ is a square matrix, and if there exists a matrix $[A]^{-1}$ such that

$$[A]^{-1}[A] = [A][A]^{-1} = [I]$$

where $[I]$ is the identity matrix for multiplication, then $[A]^{-1}$ is called the inverse of $[A]$ for multiplication.

Inverse cosine See *Inverse trigonometric ratios*.

Inverse property For each $a \in \mathbb{R}$, there is a unique number $(-a) \in \mathbb{R}$, called the *opposite* (or *additive inverse*) of a , so that

$$a + (-a) = -a + a = 0$$

Inverse sine See *Inverse trigonometric ratios*.

Inverse tangent See *Inverse trigonometric ratios*.

Inverse trigonometric ratios The inverse sine, inverse cosine, and inverse tangent are the *inverse trigonometric ratios*. For θ an acute angle in a right triangle,

$$\sin^{-1}\left(\frac{\text{OPP}}{\text{HYP}}\right) = \theta; \quad \cos^{-1}\left(\frac{\text{ADJ}}{\text{HYP}}\right) = \theta.$$

$$\tan^{-1}\left(\frac{\text{OPP}}{\text{ADJ}}\right) = \theta$$

Invert In relation to the fraction a/b , it means to interchange the numerator and the denominator to obtain the fraction b/a .

Irrational number A number that can be expressed as a nonrepeating, nonterminating decimal; the set of irrational numbers is denoted by \mathbb{Q}' .

Irrelevant alternatives criterion If a candidate is declared the winner of an election, and in a second election one or more of the other candidates is removed, then the previous winner should still be declared the winner.

Isosceles triangle A triangle with two sides the same length.

Isosceles triangle property If two sides of a triangle have the same length, then angles opposite them are equal.