non-singular A square matrix **A** is non-singular if it is not *singular; that is, if det **A** $\neq 0$, where det, **A** is the determinant of **A**. *See also* INVERSE MATRIX.

non-symmetric (of a relation) Not *symmetric, or *asymmetric, or *antisymmetric. The relation has to hold for some pairs in both orders, and hold for only one order for some other pairs, i.e. there exist elements a, b, c, d for which $a \sim b$, $b \sim a$, whereas $c \sim d$, but $d \sim c$ does not hold.

non-transitive (of a relation) Neither *transitive nor *intransitive. The transitive relationship has to hold for some triples, and not for others, i.e. there exist elements a, b, c, d, e, f for which $a \sim b$, $b \sim c$, $a \sim c$, whereas $d \sim e$, $e \sim f$, but $d \sim f$ does not hold.

norm The norm of a mathematical object is a measure which describes some sense of the length or size of the object. So the *absolute value of real numbers, *modulus of a complex number, *matrix norms and *vector norms are all examples of norms.
See also PARTITION (of an interval).

normal (to a curve) Suppose that P is a point on a curve in the plane. Then the normal at P is the line through P perpendicular to the tangent at P.

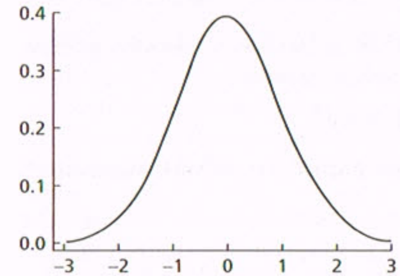
normal (to a plane) A line perpendicular to the plane. A normal is perpendicular to any line that lies in the plane.

normal (to a surface) *See* TANGENT PLANE.

normal distribution The continuous probability *distribution with *probability density function f given by

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right),$$

denoted by $N(\mu, \sigma^2)$. It has mean μ and variance σ^2. The distribution is widely used in statistics because many experiments produce data that are approximately normally distributed, the sum of random variables from non-normal distributions is approximately normally distributed (*see* CENTRAL LIMIT THEOREM), and it is the limiting distribution of distributions such as the *binomial, *Poisson and *chi-squared distributions. It is called the standard normal distribution when $\mu = 0$ and $\sigma^2 = 1$.



If X has the distribution $N(\mu, \sigma^2)$ and $Z = (X - \mu)/\sigma$, then Z has the distribution N(0, 1). The diagram shows the graph of the probability density function of N(0, 1).

The following table gives, for each value z, the percentage of observations which exceed z, for the standard normal distribution N(0, 1). Thus the values are to be used for one-tailed tests. Interpolation may be used for values of z not included.

z	0.0	0.5	1.0	1.28	1.5	1.64	1.96	2.33	2.57	3.0	3.5
%	50	30.9	15.9	10.0	6.7	5.0	2.5	1.0	0.5	0.14	0.02

normal reaction *See* CONTACT FORCE.

normal subgroup If H is a *subgroup of a *group G, and for any element, x of G, the left and right cosets of H are equal, then H is a normal subgroup.

normal vector (to a plane) A vector whose direction is perpendicular to the plane. A normal vector is perpendicular to any vector whose direction lies in the plane.

not *See* NEGATION.

not and If p and q are statements then 'p *not and* q', denoted by $p \uparrow q$, is true unless both p and q are true. Since 'not and' is cumbersome language, this is often referred to as *nand in logic. The *truth table is as follows:

p	q	$p \uparrow q$
T	T	F
T	F	T
F	T	T
F	F	T