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The number e, like the number **pi**, is a useful mathematical constant that is the basis of the system of natural **logarithms**. Its value correct to nine places is 2.718281828... The number e is used in complex **equations** to describe a process of growth or decay. It is therefore utilized in the biology, business, demographics, physics, and engineering fields.

The number e is widely used as the base in the exponential function $y = Ce^{kx}$. There are extensive tables for e^x, and scientific calculators usually include an e^x key. In **calculus** one finds that the **slope** of the graph of e^x at any point is equal to e^x itself, and that the integral of e^x is also e^x plus a constant.

Exponential functions based on e are also closely related to sines, cosines, hyperbolic sines, and hyperbolic cosines: $e^{ix} = \cos x + i\sin x$; and $e^x = \cosh x + \sinh x$. Here I is the imaginary number -1. From the first of these relationships one can obtain the curious equation $e^{i} + 1 = 0$, which combines five of the most important constants in mathematics.

The constant e appears in many other formulae in **statistics**, science, and elsewhere. It is the base for natural (as opposed to common) logarithms. That is, if $e^x = y$, then $x = \ln y$. ($\ln x$ is the symbol for the natural logarithm of x.) $\ln x$ and e^x are therefore inverse **functions**.

The expression $(1 + 1/n)^n$ approaches the number e more and more closely as n is replaced with larger and larger values. For example, when n is replaced in turn with the values 1, 10, 100, and 1000, the expression takes on the values 2, 2.59..., 2.70..., and 2.717....

Calculating a decimal approximation for e by means of the this **definition** requires one to use very large values of n, and the equations can become quite complex. A much easier way is to use the Maclaurin series for e^x: $e^x = 1 + x/1! + x^2/2! + x^3/3! + x^4/4! + \dots$. By letting x equal 1 in this series one gets $e = 1 + 1/1 + 1/2 + 1/6 + 1/24 + 1/120 + \dots$. The first seven terms will yield a three-place approximation; the first twelve will yield nine places.