Power series

A *power series* in x is an infinite series of the form $a_0 + a_1x + a_2x^2 + \cdots$, a sum of powers of x. It can also be written in the shorthand form

$$\sum_{n=0}^{\infty} a_n x^n.$$

Such series can be used to represent many functions such as $1/(1+x)$, $\sin x$, $\cos x$ and e^x. They may only be valid for some values of x. For example,

$$\frac{1}{1+x} = 1 - x + x^2 - x^3 + \cdots$$

is only valid when $|x| < 1$, but the series for $\sin x$, $\cos x$ and e^x are valid for all values of x.