

## Subject #18: List of mathematical functions

We list all the functions in the mathematical library. When they are used in a program, the line `#include <math.h>`

should be put in the beginning of the file. In all the functions,  $x, y$  are variables of type `double`, and  $n$  is a variable of type `int`. All the functions return values of type `double`. All angles are given in radians.

• <code>sin(x)</code>	sine of $x$
• <code>cos(x)</code>	cosine of $x$
• <code>tan(x)</code>	tangent of $x$
• <code>asin(x)</code>	$\sin^{-1}(x)$ in range $[-\pi/2, \pi/2]$ , $x \in [-1, 1]$
• <code>acos(x)</code>	$\cos^{-1}(x)$ in range $[0, \pi]$ , $x \in [-1, 1]$
• <code>atan(x)</code>	$\tan^{-1}(x)$ in range $[-\pi/2, \pi/2]$
• <code>atan2(y,x)</code>	$\tan^{-1}(y/x)$ in range $[-\pi, \pi]$
• <code>sinh(x)</code>	hyperbolic sine of $x$
• <code>cosh(x)</code>	hyperbolic cosine of $x$
• <code>tanh(x)</code>	hyperbolic tangent of $x$
• <code>exp(x)</code>	exponential function $e^x$
• <code>log(x)</code>	natural logarithm $\ln(x)$ , $x > 0$
• <code>log10(x)</code>	base 10 logarithm $\log_{10}(x)$ , $x > 0$
• <code>pow(x,y)</code>	$x^y$ . A domain error occurs if $x = 0$ and $y \leq 0$ , or if $x < 0$ and $y$ is not an integer
• <code>sqrt(x)</code>	$\sqrt{x}$ , $x \geq 0$
• <code>ceil(x)</code>	smallest integer not less than $x$ , as a <code>double</code>
• <code>floor(x)</code>	largest integer not greater than $x$ , as a <code>double</code>
• <code>fabs(x)</code>	absolute value $ x $
• <code>ldexp(x,n)</code>	$x \cdot 2^n$
• <code>frexp(x, int *exp)</code>	splits $x$ into a normalized fraction in the interval $[1/2, 1)$ , which is returned, and a power of 2, which is stored in <code>*exp</code> . If $x$ is zero, both parts of the result are zero.
• <code>modf(x, double *ip)</code>	splits $x$ into integral and fractional parts, each with the same sign as $x$ . It stores the integral part in <code>*ip</code> , and returns the fractional part.
• <code>fmod(x,y)</code>	floating-point remainder of $x/y$ , with the same sign as $x$ . If $y$ is zero, the result is implementation defined