

# Error Function

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In mathematics, the error function (also called the Gauss error function) is a special function (non-elementary) of sigmoid shape that occurs in probability, statistics, and partial differential equations describing diffusion. It is defined as:

$$\begin{aligned}\operatorname{erf}(x) &= \frac{1}{\sqrt{\pi}} \int_{-\infty}^x e^{-t^2} dt \\ &= \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt .\end{aligned}$$

In statistics, for nonnegative values of  $x$ , the error function has the following interpretation: for a random variable  $X$  that is normally distributed with mean 0 and variance 1/2,  $\operatorname{erf}(x)$  describes the probability of  $X$  falling in the range  $[-x, x]$ . [1]

A plot of the error function is shown in fig. 1.

## References

- [1] Wikipedia, the free encyclopedia,  
[https://en.wikipedia.org/wiki/Error\\_function](https://en.wikipedia.org/wiki/Error_function)

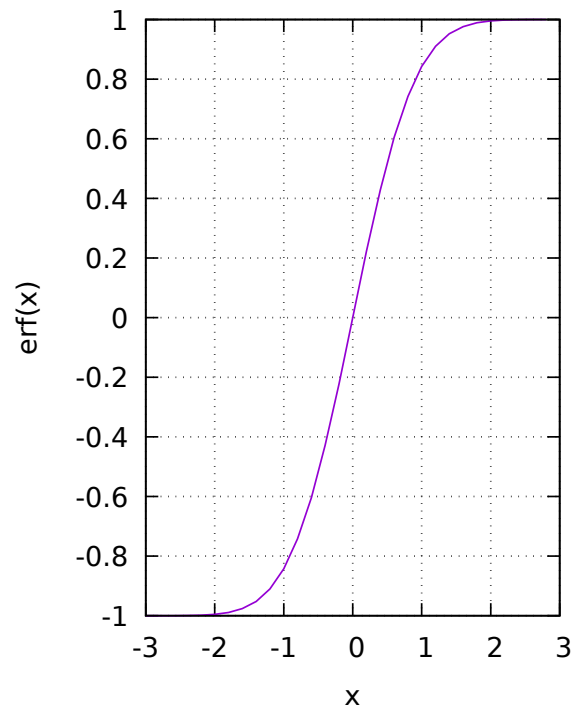


Figure 1: The error function.