



Tutorials and worked examples for simulation,  
curve fitting, statistical analysis, and plotting.  
<https://simfit.org.uk>

Sometimes it is required to use  $\LaTeX$  to display a mathematical equation inside a scientific plot, and this document describes how to do this for the normal distribution cumulative distribution function  $\Phi(x)$ . Note that all the files mentioned in this document are distributed as SIMFIT test files so that users simply wishing to create the final composed document can proceed directly to the last section describing how to use **EditSVG**.

## The TEX source

This is the code contained in the file `latex_maths_equation.tex`

```
\documentclass[12pt]{article}
\usepackage{amsmath,bm}
\pagestyle{empty}
\begin{document}
\Large
\[
\frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^x \exp - \left\{ \frac{1}{2} \left( \frac{t - \mu}{\sigma} \right)^2 \right\} dt
\]
\end{document}
```

which displays the mathematical definition of  $\Phi(x)$  as follows.

$$\frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^x \exp - \left\{ \frac{1}{2} \left( \frac{t - \mu}{\sigma} \right)^2 \right\} dt$$

In order to import this formula into a graph using **EditSVG** this code must be used to create the corresponding SVG file `latex_maths_equation.svg`, the overall process being the following sequence of commands.

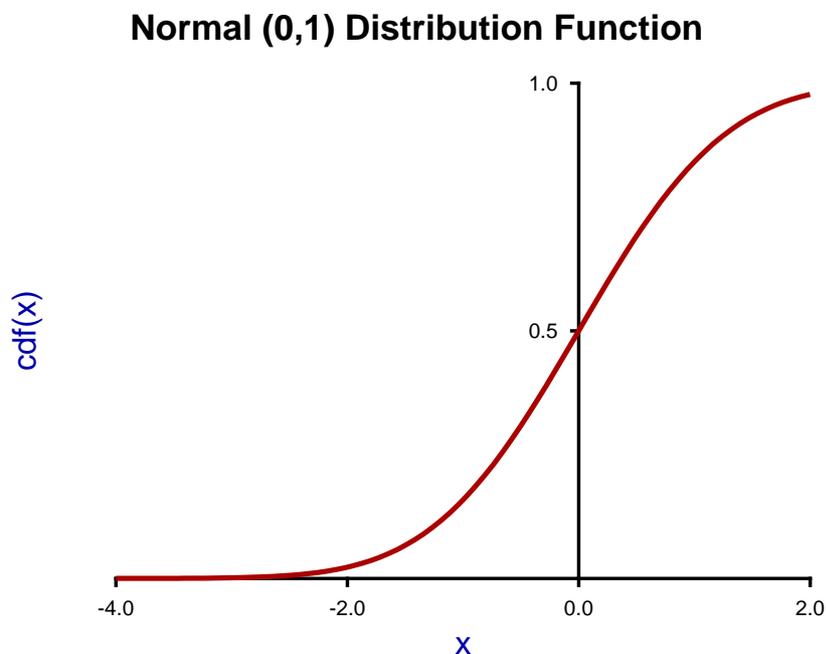
- **latex** `latex_maths_equation.tex`
- **dvips** `latex_maths_equation.dvi`
- **dvismgm** `-E latex_maths_equation.ps`

The file `latex_maths_equation.svg` created is then ready to be imported into **EditSVG** but, alternatively, the source file `latex_maths_equation.tex` can be opened in or dragged and dropped directly onto **EditSVG** if there is a local installation of  $\LaTeX$ .

It should be realized that, when using  $\LaTeX$  in this way to create a SVG file, the command line must be used from a folder containing the \*.TEX file required as a local file and not as a fully qualified path-filename to a remote source file. The program **EditSVG** circumvents this issue when importing  $\LaTeX$  source by creating local copies of all files.

## Creating the plot file

The file `latex_maths_plot.svg` with the  $\Phi(x)$  profile to be used looks like this before the equation is added.



This figure was created using **makmat** by selecting to display the normal cumulative distribution  $\Phi(x)$  with  $\mu = 0$  and  $\sigma^2 = 1$  for  $-4 \leq x \leq 2$ , and then transferring the resulting plot into the program **simplot** using the [Advanced] option to manipulate the title, legends, line-widths, and colors, etc.

Users wishing to avoid this process can simply read the SIMFIT metafile `latex_maths_plot.metafile` directly into the SIMFIT program **simplot**, or the SIMDEM program **simdem70**.

In either case the file is then saved as `latex_maths_plot.svg` using the [Win] or [SVG] option.

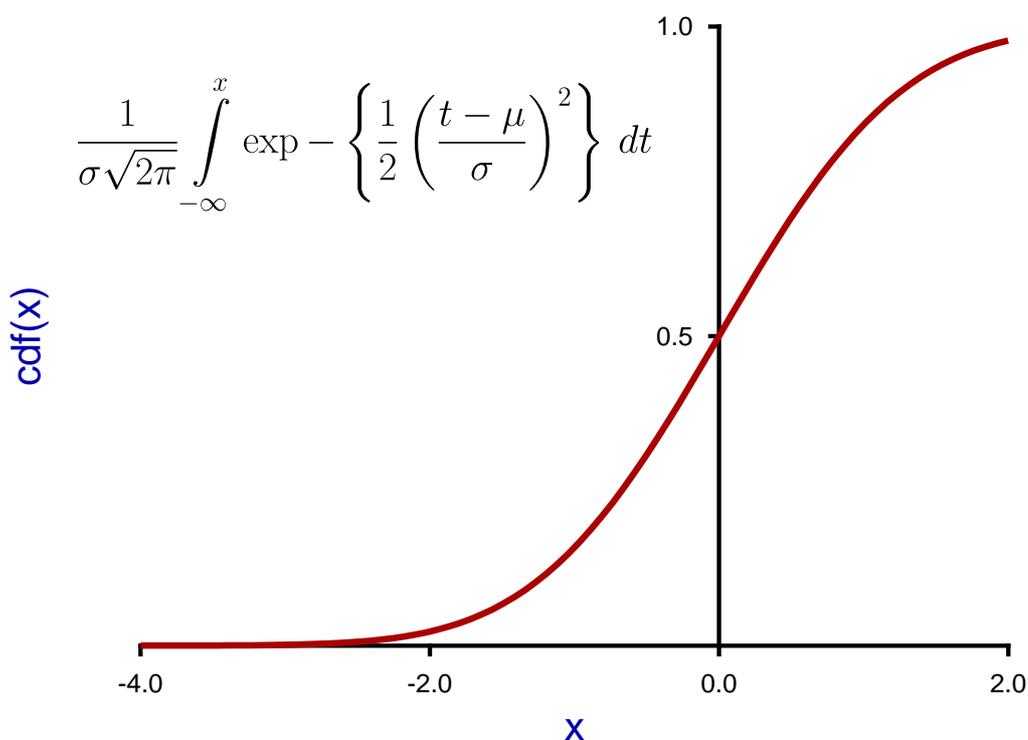
## Joining the SVG files using EditSVG

First open program **EditSVG** then input the test file `latex_maths_plot.svg` to act as a background, then there two possible options.

1. Input the test file `latex_maths_equation.svg` directly; or
2. read in the test file `latex_maths_equation.tex` which will then be used by  $\text{\LaTeX}$  to generate an internal copy of `latex_maths_equation.svg`.

Finally, just use the mouse to move the equation into position and alter the scaling as required to obtain the final plot saved as `latex_maths.svg` and shown next.

## Normal (0,1) Distribution Function



### Summary

The programs referred to in this document are as follows.

1. **InkScape** is an OpenSource program that takes in SVG files and can write out EPS and other files.
2. **EditSVG** is a `SIMFJT` and `SIMDEM` program that takes in SVG or TEX files and writes out SVG and other files.
3. **editPS** is a `SIMFJT` and `SIMDEM` program that takes in EPS files and writes out only EPS files.
4. The `SIMFJT` program **simplot** and the `SIMDEM` program **simdem70** take in `SIMFJT` metafiles and write out either SVG or EPS files.

Further, the `SIMFJT` test files (\*.TEX and \*.SVG) described in this document that can be used by program **EditSVG**, and those (\*.EPS) that can be used by program **editPS** are now listed.

File name	Data included
latex_maths_plot.metafile	<code>SIMFJT</code> or <code>SIMDEM</code> metafile to create the plot without any equation
latex_maths_equation.tex	$\LaTeX$ source file for the maths equation with no plot
latex_maths_equation.svg	SVG file containing the formula only
latex_maths_plot.svg	SVG file containing the plot only
latex_maths.svg	SVG file containing both the equation and plot
latex_maths_equation.eps	EPS file containing the formula only
latex_maths_plot.eps	EPS file containing the plot only
latex_maths.eps	EPS file containing both the equation and plot