

Properties of a Gaussian Distribution

This worksheet generates a gaussian distribution for a given average and standard deviation.

Average: $\mu := 0$

Standard deviation: $\sigma := 1$

Amplitude: $A := 1$

The equation for a gaussian distribution (with an amplitude of A):

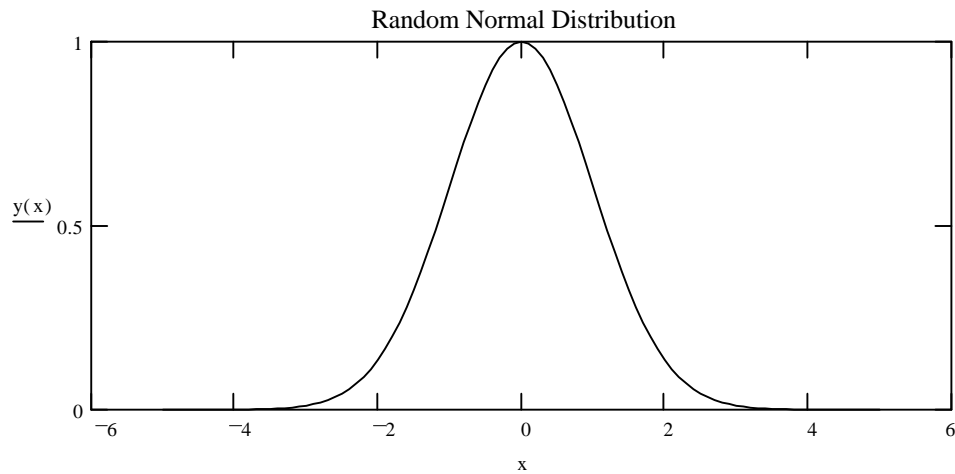
$$y(x) := A \cdot e^{-\frac{1}{2} \cdot \left(\frac{x-\mu}{\sigma}\right)^2}$$

Range to Plot:

start := -5

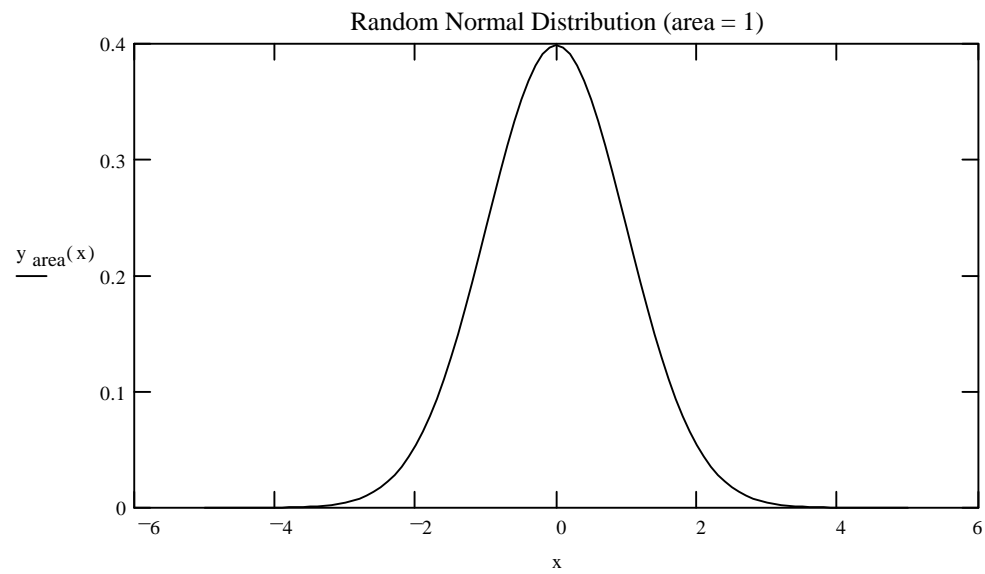
stop := 5

$$x := \text{start}, \left[\text{start} + \left(\frac{\text{stop} - \text{start}}{100} \right) \right] .. \text{stop}$$



Equation for a gaussian distribution with an area of 1:

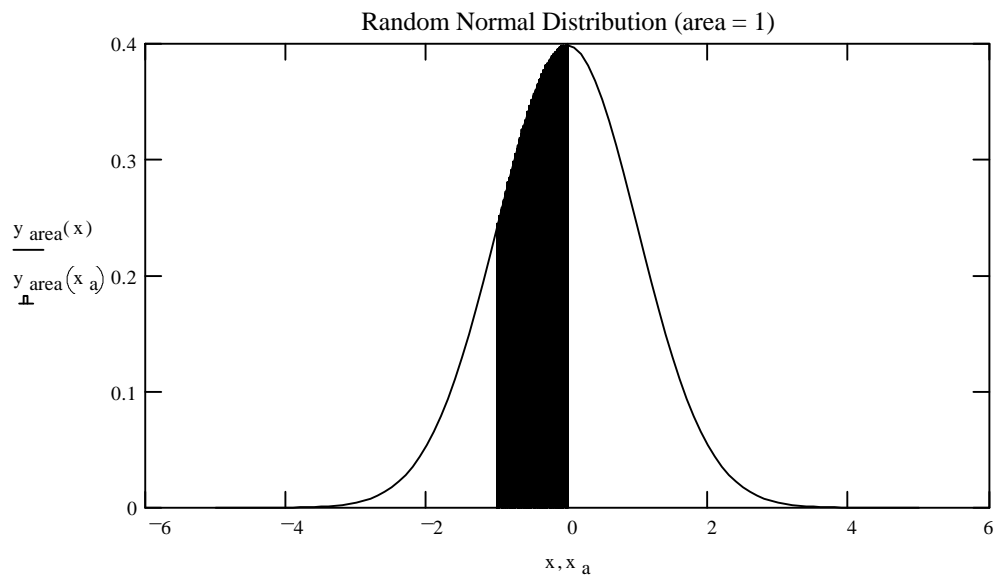
$$y_{\text{area}}(x) := \left(\frac{1}{\sigma \cdot \sqrt{2 \cdot \pi}} \right) \cdot e^{-\frac{1}{2} \cdot \left(\frac{x - \mu}{\sigma} \right)^2}$$



Finding the area under part of a gaussian distribution:

start := - 1

stop := 0 $x_a := \text{start}, \left[\text{start} + \left(\frac{\text{stop} - \text{start}}{100} \right) \right] .. \text{stop}$



Numerical integration of a gaussian curve (taken using 100 steps):

$$\sum_{x_a} \frac{y_{\text{area}}(x_a)}{100} = 0.345$$

Integration of a gaussian curve using calculus:

$$\int_{\text{start}}^{\text{stop}} \frac{1}{\sigma \cdot \sqrt{2 \cdot \pi}} \cdot e^{-\frac{(x - \mu)^2}{2 \cdot \sigma^2}} dx = 0.3413447461$$

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