# Law of Large Numbers

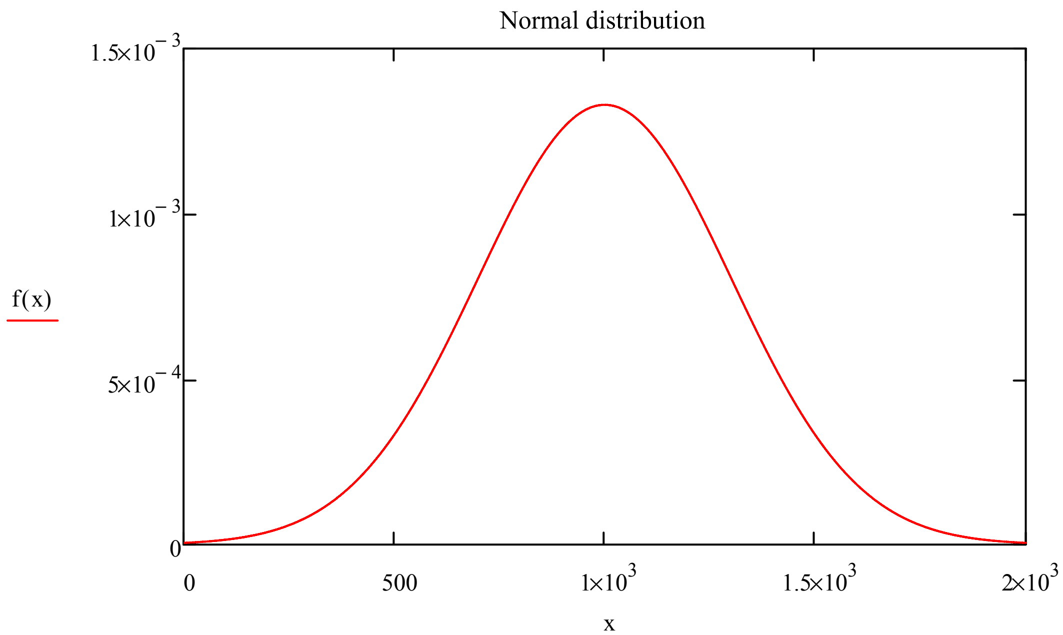
$x := 0 .. 2000$ Random variable

$\mu := 1000$ Expected value of the random variable

$\sigma := 300$ Standard deviation of the random variable

$$f(x) := \frac{1}{\sigma \cdot \sqrt{2 \cdot \pi}} \cdot e^{-0.5 \cdot \left(\frac{x-\mu}{\sigma}\right)^2}$$

Probability distribution of the random variable (normal distribution)




$n := 10$ Number of values drawn from the probability distribution

$x := \text{rnorm}(n, \mu, \sigma)$ Random generator

Actual values of random variable

x =

| | 1 |
|---|---|
| 1 | 868 |
| 2 | 796 |
| 3 | 858 |
| 4 | 715 |
| 5 | 494 |
| 6 | 1013 |
| 7 | 964 |
| 8 | 1167 |
| 9 | 1658 |
| 10 | 1243 |

$x_d := \frac{1}{n} \cdot \sum x$ Average actual value

$x_d = 978$

According the the central limit theorem (law of large numbers) the average actual value approaches the expected value, when the number of values drawn from the probability distribution approaches infinity:

$$\lim_{n \to \infty} x_d = \mu$$

$\text{ORIGIN} \equiv 1$