

0.1 Definition

It is hard to say normal distribution is what, since almost every thing follows it.

The Probability Distribution Function (*pdf*) of normal distribution is

$$p(x) = \frac{1}{\sqrt{2\pi}\delta} \exp\left(-\frac{(x-\mu)^2}{2\delta^2}\right), -\infty < x < \infty \quad (1)$$

the symbolic notion is $p(x) \sim \mathcal{N}(\mu, \delta^2)$. When $\mu = 0$ and $\delta^2 = 1$, it is called standard normal distribution.

0.2 Mean and Variance

The mean and variance of the normal distribution is

$$\begin{aligned} \text{Mean} &\triangleq E(x) = \mu \\ \text{Variance} &\triangleq E(x^2) - E^2(x) = \delta^2 \end{aligned}$$

it is easy to proof using Proposition ??.