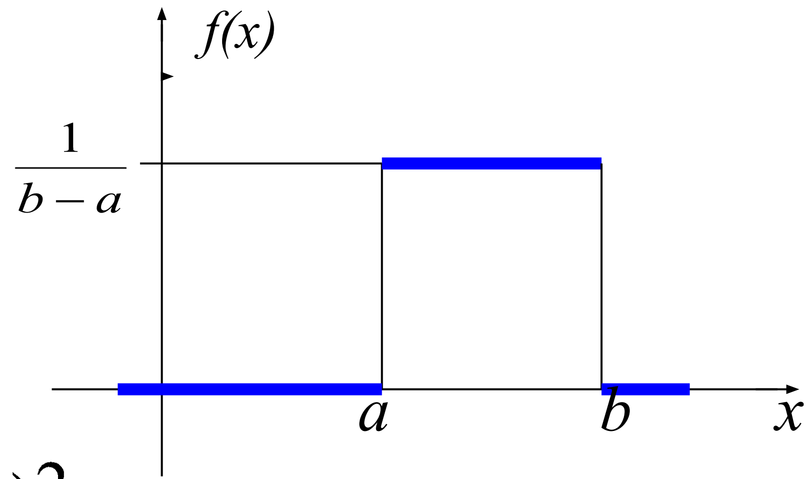
Равномерное распределение *R(a, b)*

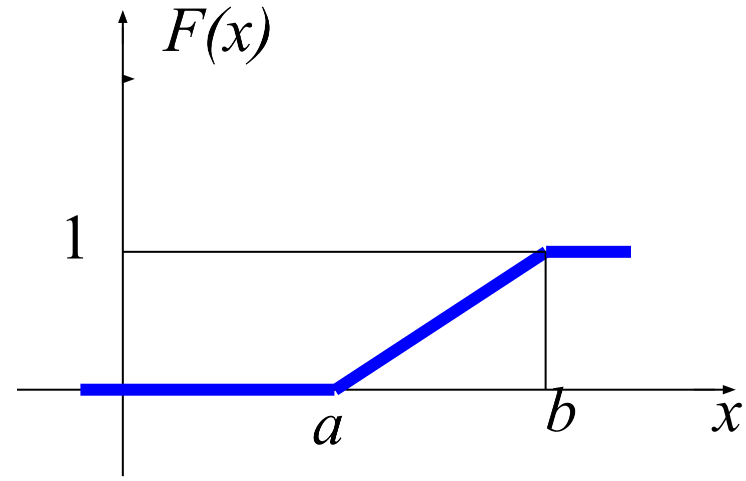
$$f(x)=\begin{cases}\dfrac{1}{b-a}, & x\in(a;b)\\ 0, & x\notin(a;b)\end{cases}$$



$$m=\frac{a+b}{2}$$

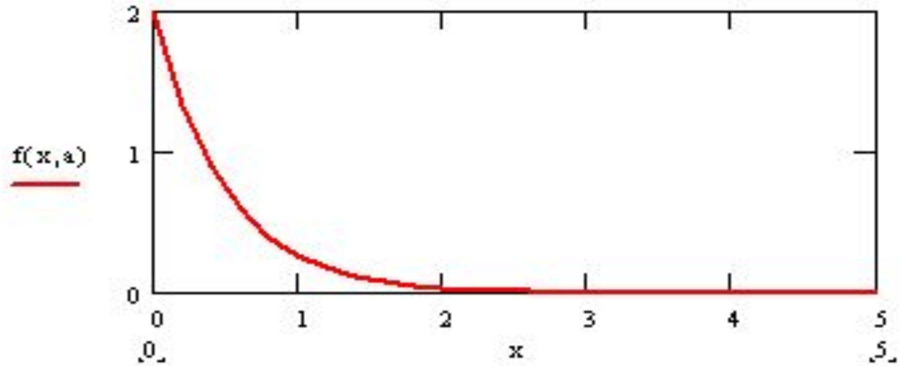
$$D=\frac{(b-a)^2}{12}$$

$$F(x)=\begin{cases}0, & x\le a\\ \dfrac{x-a}{b-a}, & a<x\le b\\ 1, & x>b\end{cases}$$



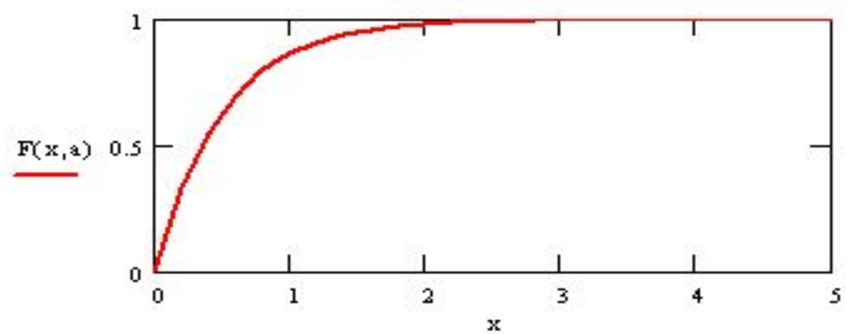
Экспоненциальное распределение *E(λ)*

$$f(x)=\begin{cases}\lambda e^{-\lambda x}, & x\geq 0\\ 0, & x<0\end{cases}$$



$$m=\frac{1}{\lambda}\qquad D=\frac{1}{\lambda^2}$$

$$F(x)=\begin{cases}0, & x\leq 0\\ 1-e^{-\lambda x}, & x>0\end{cases}$$



Нормальное распределение $N(a, \sigma)$

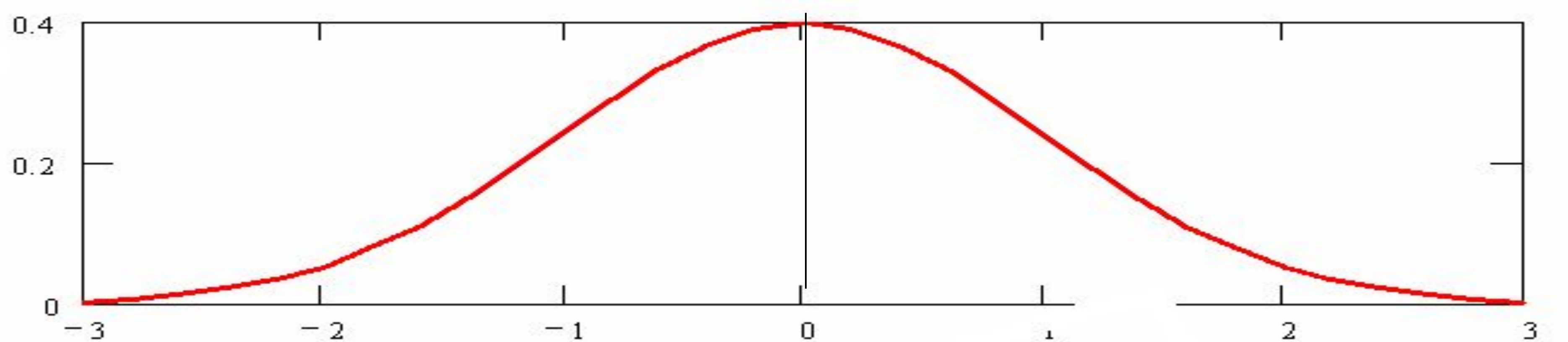
Плотность распределения

$$f(x)=\frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{(x-a)^2}{2\sigma^2}} \qquad x\in(-\infty;+\infty)$$

$$X_0 \sim N(0,1) \Leftrightarrow f_0(x)=\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}$$

- стандартное нормальное распределение

$$M(X_0)=0 \qquad D(X_0)=1$$



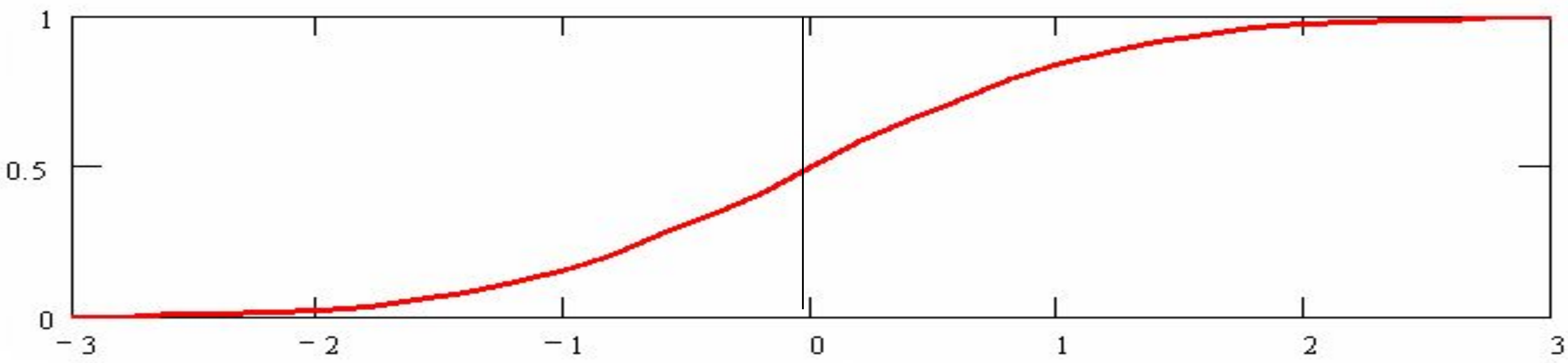
Нормальное распределение $N(a, \sigma)$

$$X_0 \sim N(0,1) \Leftrightarrow f_0(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

- стандартное нормальное распределение

Функция распределения $N(0, 1)$

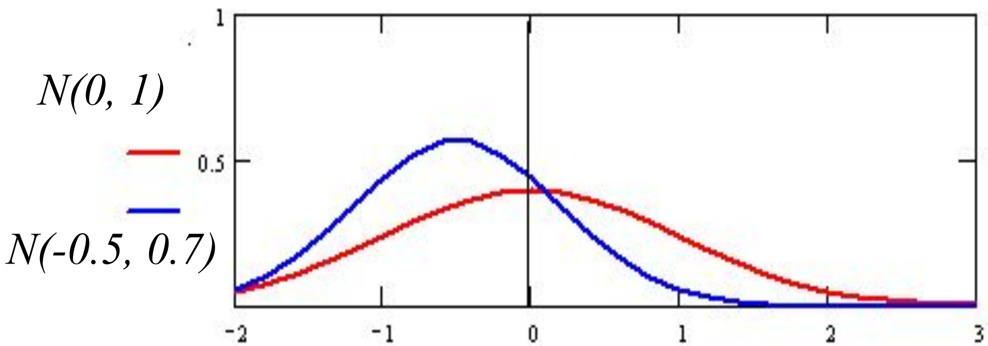
$$F_0(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{x^2}{2}} dx$$

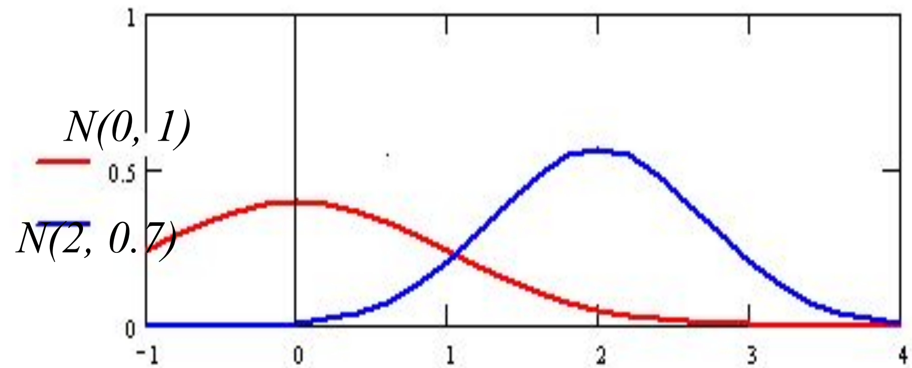


Нормальное распределение $N(a, \sigma)$

$$X = a + \sigma \cdot X_0 \Rightarrow X \sim N(a, \sigma) \qquad f(x) = \frac{1}{\sigma} f_0\left(\frac{x-a}{\sigma}\right)$$

$$m_X = a \quad D_X = \sigma^2 \qquad \mu_r = (r-1)\sigma^2 \mu_{r-2}$$





$$P(\alpha \le X \le \beta) = F_X(\beta) - F_X(\alpha) =$$

$$= F_0\left(\frac{\beta - a}{\sigma}\right) - F_0\left(\frac{\alpha - a}{\sigma}\right)$$

Функция Лапласа

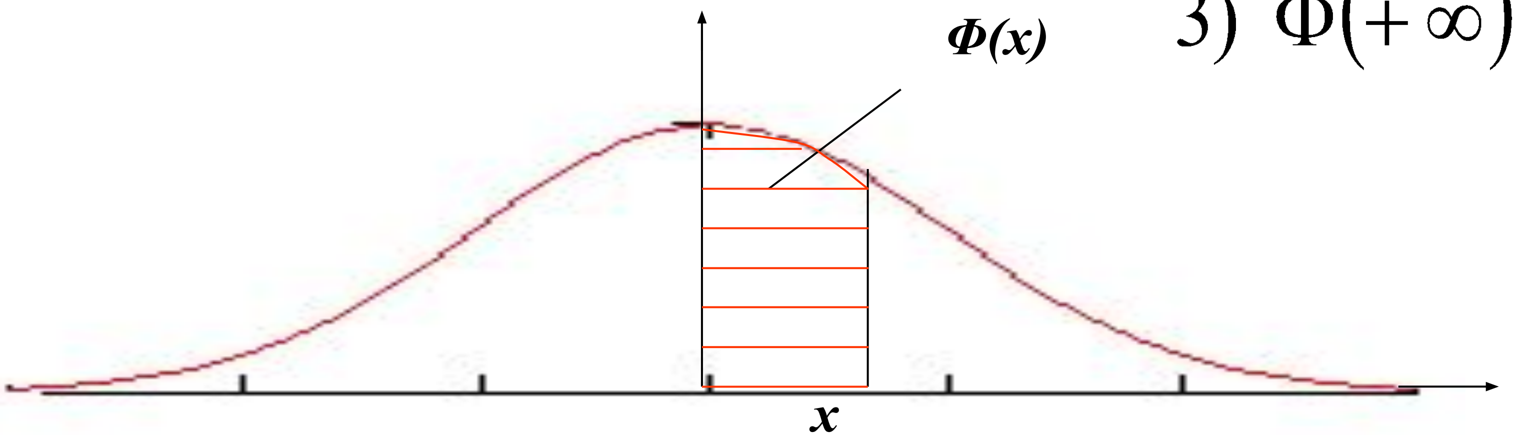
$$\Phi(x) = \frac{1}{\sqrt{2\pi}} \int_0^x e^{-\frac{t^2}{2}} dt$$

Свойства

1) $\Phi(0) = 0$

2) $\Phi(-x) = -\Phi(x)$

3) $\Phi(+\infty) = \frac{1}{2}$



$$P(\alpha \le X \le \beta) = \Phi\left(\frac{\beta - a}{\sigma}\right) - \Phi\left(\frac{\alpha - a}{\sigma}\right)$$

Функция Лапласа

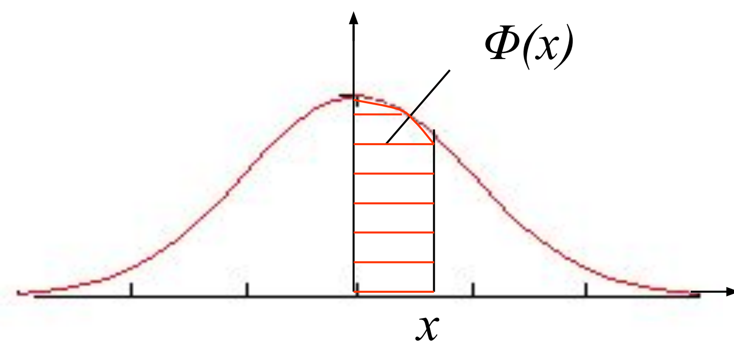
$$P(\alpha \le X \le \beta) = \Phi\left(\frac{\beta - a}{\sigma}\right) - \Phi\left(\frac{\alpha - a}{\sigma}\right)$$

$$P\left(\left|X - m_X\right| < \varepsilon\right) = 2\Phi\left(\frac{\varepsilon}{\sigma}\right)$$

Свойства

1) $\Phi(0) = 0$
2) $\Phi(-x) = -\Phi(x)$
3) $\Phi(+\infty) = \frac{1}{2}$

$\varepsilon = \sigma$	$2\Phi(1)$	0,68
$\varepsilon = 2\sigma$	$2\Phi(2)$	0,95
$\varepsilon = 3\sigma$	$2\Phi(3)$	0,997



$$F_0(x) = \frac{1}{2} + \Phi(x)$$