

# Scipy Continuous Distribution Matrix

Distribution	MEAN	VAR	PDF	CDF
Normal ex: heights of women or heights of men are normally distributed <code>loc</code> is $\mu$ , <code>scale</code> is $\sigma$	$\mu$	$\sigma^2$	$\frac{1}{\sqrt{2\pi\sigma^2}}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	$\frac{1}{2} \left[ 1 + \operatorname{erf} \left( \frac{x-\mu}{\sigma\sqrt{2}} \right) \right]$
<code>norm_dist = scs.norm(loc=0, scale=2) norm_sample = scs.norm.rvs(loc=0, scale=1, size=20)</code>	<code>norm_dist.mean()</code>	<code>norm_dist.var()</code>	<code>norm_dist.pdf(x=0)</code>	<code>norm_dist.cdf(x=0)</code>
Uniform ex: distribution of results of die rolls <code>loc</code> is $a$ , <code>scale</code> is $b - a$	$\frac{a+b}{2}$	$\frac{(a+b)^2}{12}$	$\frac{1}{b-a}$ for $x \in [a, b]$ 0 otherwise	0 for $x < a$ $\frac{x-a}{b-a}$ for $x \in [a, b]$ 1 for $x \geq b$
<code>unif_dist = scs.uniform(loc=0, scale=10) unif_sample = scs.uniform.rvs(loc=0, scale=10, size=20)</code>	<code>unif_dist.mean()</code>	<code>unif_dist.var()</code>	<code>unif_dist.pdf(x=3)</code>	<code>unif_dist.cdf(x=3)</code>
Exponential <code>scale</code> is $\lambda$ , <code>loc</code> is typically 0	$\lambda^{-1}$	$\lambda^{-2}$	$\lambda e^{-\lambda x}$	$\lambda e^{-\lambda x}$
<code>exp_dist = scs.expon(loc=0, scale=2) exp_sample = scs.expon.rvs(loc=0, scale=2, size=20)</code>	<code>exp_dist.mean()</code>	<code>exp_dist.var()</code>	<code>exp_dist.pdf(x=1)</code>	<code>exp_dist.cdf(x=1)</code>
Gamma <code>a</code> is $k$ , <code>scale</code> is $\theta$ , <code>loc</code> is typically 0	$k\theta$	$k\theta^2$	$\frac{1}{\Gamma(k)\theta^k} x^{k-1} e^{-\frac{x}{\theta}}$	$\frac{1}{\Gamma(k)} \gamma(k, \frac{x}{\theta})$
<code>gam_dist = scs.gamma(a=1, loc=0, scale=2) gam_sample = scs.gamma.rvs(a=1, loc=0, scale=2, size=20)</code>	<code>gam_dist.mean()</code>	<code>am_dist.var()</code>	<code>gam_dist.pdf(x=3)</code>	<code>gam_dist.cdf(x=3)</code>

## References

Mathematical equations are copied from Wikipedia.