Scipy Discrete Distribution Matrix

Distribution	MEAN	VAR	PMF	CDF
Bernoulli ex: distribution of a single coin flip	p	$p(1-p)$	$1-p$ for $k=0$ p for $k=1$	0 for $k=0$ $1-p$ for $0 \leq k < 1$ 1 for $k \geq 1$

`bern_dist = scs.bernoulli(p=0.5)`
 	
`bern_sample = scs.bernoulli.rvs(p=0.5, loc=0, size=100)`
	`bern_dist.mean()`	`bern_dist.var()`	`bern_dist.pmf(k=1)`	`bern_dist.cdf(x=0.75)`

Binomial distribution of multiple binary events	np	$np(1-p)$	$\binom{n}{k} p^k (1-p)^{n-k}$	$(n-k)\binom{n}{k} \int_0^{1-p} t^{n-k-1}(1-t)^k \mathrm{d}t$

`binom_dist = scs.binom(n=50, p=0.5)`
 	
`binom_dist_sample = scs.binom.rvs(n=50, p=0.5, loc=0, size=20)`
	`binom_dist.mean()`	`binom_dist.var()`	`binom_dist.pmf(k=25)`	`binom_dist.cdf(x=25)`

Poisson `mu` is λ, `loc` is typically 0	λ	λ	$\frac{\lambda^k e^{-\lambda}}{k!}$	$e^{-\lambda} \sum_{k=0}^{\infty} \frac{\lambda^i}{i!}$

`pois_dist = scs.poisson(mu=3, loc=0)`
 	
`pois_sample = scs.poisson.rvs(mu=3, loc=0, size=20)`
	`pois_dist.mean()`	`pois_dist.var()`	`pois_dist.pmf(k=2)`	`pois_dist.cdf(x=2)`

Geometric	$1/p$	$\frac{1-p}{p^2}$	$(1-p)^{k-1}p$	$1-(1-p)^k$

`geom_dist = scs.geom(p=0.25, loc=0)`
 	
`geom_sample = scs.geom.rvs(p=0.25, loc=0, size=20)`
	`geom_dist.mean()`	`geom_dist.var()`	`geom_dist.pmf(k=4)`	`geom_dist.cdf(x=4)`

References

Mathematical equations are copied from Wikipedia.