Discrete Distributions in R

Bernoulli(p)

Test whether a single event occurs.

- p = probability of event occurring.

$$\mu = p \qquad \sigma^2 = p(p-1)$$

Binomial(n, p)

$\mathrm{P}(X = x)$ = `dbinom(x, n, p)`
$\mathrm{P}(X \le x)$ = `pbinom(x, n, p)`

Count how many times event occurs in a sequence of attempts.

- n = number of times event **could** occur
- p = probability of event occurring

$$\mu = np \qquad \sigma^2 = np(p-1)$$

HyperGeom.(N, M, k)

$\mathrm{P}(X = x)$ = `dhyper(x, n, m, k)`
$\mathrm{P}(X \le x)$ = `phyper(x, n, m, k)`

Count how many times an event occurs in a sample drawn from a fixed, categorized population.

- N = total number of occurrences
- M = total number of non-occurrences
- k = size of sample

$$\mu = kp \qquad \sigma^2 = kp(p-1)\frac{N-k}{N-1}$$

$$\left(\text{where } p = \frac{N}{N+M}\right)$$

Geometric(p)

$\mathrm{P}(X = x)$ = `dgeom(x, p)`
$\mathrm{P}(X \le x)$ = `pgeom(x, p)`

Count how many times an event **doesn't** occur before it finally occurs.

- p = probability of event occurring

$$\mu = {}^1\!/_p - 1 \qquad \sigma^2 = \frac{p}{(1-p)^2}$$

Neg.Binom.(r, p)

$\mathrm{P}(X = x)$ = `dnbinom(x, r, p)`
$\mathrm{P}(X \le x)$ = `pnbinom(x, r, p)`

Count how many times an event **doesn't occur** before it finally occurs ***r* times**.

- r = required number of event occurrences
- p = probability of event occurring

$$\mu = r\,({}^1\!/_p - 1) \qquad \sigma^2 = r\,\frac{p}{(1-p)^2}$$

Poisson(μ)

$\mathrm{P}(X = x)$ = `dpois(x, μ)`
$\mathrm{P}(X \le x)$ = `ppois(x, μ)`

Count how many times an event occurs in a period of time.

- μ = expected number of occurences

$$\mu = \mu \qquad \sigma^2 = \mu$$