Discrete Distributions

Distribution	Probability mass function	Mean μ	Variance σ^2
Uniform(n)	$p(x) = \frac{1}{n}$ for $x = 1, 2, \ldots, n$	$\frac{n+1}{2}$	$\frac{n^2-1}{12}$
Bernoulli(p) **Success** on single trial	$p(0) = 1-p, \qquad p(1) = p$	p	$p(1-p)$
Binomial(n,p) Number of **successes** in n *independent* trials	$p(x) = \binom{n}{x} p^x (1-p)^{n-x}$ for $x = 0, 1, 2, \ldots, n$	np	$np(1-p)$
Hypergeometric (n, M, N) Number of **successes** in n trials *without replacement*	$p(x) = \frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$ for any integer x satisfying $\max(0, n-N+M) \le x \le \min(n, M)$	$n \cdot \frac{M}{N}$	$\frac{N-n}{N-1} \cdot np(1-p)$ where $p = \frac{M}{N}$
Geometric(p) Number of **trials** to obtain the first success	$p(x) = p(1-p)^{x-1}$ for $x = 1, 2, 3, \ldots$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Geometric(p) Number of **failures** before the first success	$p(x) = p(1-p)^x$ for $x = 0, 1, 2, \ldots$	$\frac{1-p}{p}$	$\frac{1-p}{p^2}$
Negative Binomial(r,p) Number of **trials** to obtain the r^{th} success	$p(x) = \binom{x-1}{r-1} p^r (1-p)^{x-r}$ for $x = r, r+1, r+2, \ldots$	$\frac{r}{p}$	$\frac{r(1-p)}{p^2}$
Negative Binomial(r,p) Number of **failures** before the r^{th} success	$p(x) = \binom{x+r-1}{r-1} p^r (1-p)^x$ for $x = 0, 1, 2, \ldots$	$\frac{r(1-p)}{p}$	$\frac{r(1-p)}{p^2}$
Poisson(λ) or Poisson process with $\lambda = \alpha t$	$p(x) = \frac{e^{-\lambda}\lambda^x}{x!}$ for $x = 0, 1, 2 \ldots$	λ	λ

Continuous Distributions

Distribution	Probability density function	Mean μ	Variance σ^2
Uniform on $[a, b]$	$f(x) = \frac{1}{b-a} \quad$ for $a \le x \le b$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Normal(μ, σ)	$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ for $-\infty < x < \infty$	μ	σ^2
Exponential(λ)	$f(x) = \lambda e^{-\lambda x} \quad$ for $x \ge 0$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$