Table of Distributions

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Discrete Distributions

Distribution	**Parameters**	$f(x)$	**Value domain**	**F(x)**	**E(X)**	**Var(X)**	$M_x(t)$	$P_x(t)$
Bernoulli Bernoulli(p)	$p \in [0, 1]$	$\begin{cases} q, & \text{if k=0} \\ p, & \text{if k=1} \end{cases}$	x = $\{0, 1\}$	$\begin{cases} 0, & \text{if k<0} \\ q, & \text{if 0<=k<1} \\ 1, & \text{if k>=1} \end{cases}$	p	pq	$p(e^t + q)$	$(pt + q)$
Binomial $B(n, p)$	$n \in$ {0,1,..,} $p \in$ [0,1]	$\binom{n}{k} p^x q^{n-x}$	x = 0,1,...,n		np	npq	$p(e^t + q)^n$	$(pt + q)^n$
Poisson $Poisson(\lambda)$	$\lambda > 0$	$e^{-\lambda} \frac{\lambda^x}{x}$	x = 0,1,...	–	λ	λ	$e^{\lambda(e^t - 1)}$	$e^{\lambda(t-1)}$
Geometric 0 $G_0(p)$	$p \in [0, 1]$	$q^x p$	x = 0,1,2,...	$1 - q^{x-1}$	$\frac{q}{p}$	$\frac{q}{p^2}$	$\frac{p}{1-qe^t}$	
Geometric 1 $G_1(p)$	$p \in [0, 1]$	$q^{x-1} p$	x = 1,2,...	$1 - q^x$	$\frac{1}{p}$	$\frac{q}{p^2}$	$\frac{pe^t}{1-qe^t}$, $t < -ln(q)$	
Negative Binomial 0 $NB_0(r, p)$								
Negative Binomial 1 $NB_1(r, p)$								
Hypergeometric $h(v, a, b)$	$a, b, n :$ pos. integers $n <= a + b$	$\frac{\binom{a}{x}\binom{b}{n-x}}{\binom{a+b}{n}}$	x=0,1,2,...n		$\frac{a}{a+b}$		–	–
Discrete Uniform $U(a, b)$	$a, b, n :$ pos. integers $n <= a + b$	$\frac{\binom{a}{x}\binom{b}{n-x}}{\binom{a+b}{n}}$	x=0,1,2,...n		$\frac{a+b}{2}$		–	–

Continuous Distributions

Distribution	**Parameters**	$f(x)$	**Value domain**	**F(x)**	**E(X)**	**Var(X)**	$M_x(t)$
Uniform $U(a,b)$	$-\infty < a < b < +\infty$	$\frac{1}{b-a}$	$x \in [a,b]$	$\begin{cases} 0, & x < a \\ \frac{x-a}{b-a}, & a \leq x \leq b \\ 1, & x > b \end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{tb}-e^{ta}}{t(b-a)}$
Normal $N(n,p)$	$n \in$ {0,1,..,} $p \in$ [0,1]	$\phi(x) = \frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	$x \in [-\infty, \infty]$		μ	σ^2	$e^{\mu t+\frac{\sigma^2 t^2}{2}}$
Standard Normal $N(0,1)$	–	$\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}$	x = 0,1,...		0	1	
Exponential $Exp(\lambda)$	$\lambda > 0$	$\lambda e^{-\lambda x}$	$x \in [0,\infty]$	$1 - e^{-\lambda x}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$	
Gamma $Gamma(k,\theta)$	$k > 0$ θ >0	$\frac{x^{k-1}e^{-\frac{x}{\theta}}}{\theta^k \gamma(k)}$	$x \in [0,\infty]$		$k\theta$	$k\theta^2$	$(1-\theta t)^{-k}, t < \frac{1}{\theta}$
Beta $Beta(\alpha,\beta)$	$\alpha > 0$ β >0	$\frac{x^{\alpha-1}(1-x)^{\beta-1}}{B(a,b)}$	$x \in [0,1]$		$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$	
Weibull $Wei(\lambda,k)$	$\lambda \in (0,+\infty)$ $k \in (0,+\infty)$	$\begin{cases} \frac{k}{\lambda}(\frac{x}{\lambda})e^{-(\frac{x}{\lambda})^k}), & xheq0 \\ 0, & x < 0 \end{cases}$	$x \in [0,\infty]$	$\begin{cases} 1 - e^{-(\frac{x}{\lambda})}, & xheq0 \\ 0, & x < 0 \end{cases}$	$\lambda\,\Gamma(1+\frac{1}{k})$		
Erlang $Erl(k,\lambda)$ alt. $beta = \frac{1}{\lambda}$	$k \in 1,2,3,\ldots$ $\lambda \in (0,\infty)$	$\frac{\lambda^k x^{k-1}e^{-\lambda x}}{(k-1)!}$	$x \in [0,\infty]$		$\frac{k}{\lambda}$	$\frac{k}{\lambda^2}$	$(1-\frac{t}{\lambda})^{-k}$ $t < \lambda$
Pareto I $Pareto(\alpha,\beta)$	$a > 0$ $b > 0$	$\frac{\alpha\beta^\alpha}{(\beta+x)^{a+1}}$	$x \in [0,+\infty]$		$\frac{\beta}{\alpha-1}$, $\alpha > 1$	$\frac{\alpha\beta^2}{(\alpha-1)^2(\alpha-2)}$	–
Pareto II $Pareto$	$a > 0$ $b > 0$		$x \in [0,+\infty]$				–
Lognormal $logN(\mu,\sigma^2)$	$\mu \in (-\infty,+\infty)$ $\sigma > 0$	$\frac{e^{-\frac{1}{2}(\frac{logx-\mu}{\sigma})}}{x\sigma\sqrt{2\pi}}$	$x \in (0,+\infty)$	Compl. expression	$e^{\mu+\frac{\sigma^2}{2}}$	$(e^{\sigma^2}-1)(e^{2\mu+\sigma^2})$	–