Beberapa Fungsi Distribusi Variabel Random

Distribusi	Fungsi densitas peluang	Mean	Variansi	MGF $M_x(t)$
Binomial $X \sim BIN(n, p)$ 0<p<1; q =1- p	$f(x) = \binom{n}{x} p^x q^{n-x}$; x = 0,1,2,...,n	np	npq	$\left(pe^t + q\right)^n$
Bernoulli $X \sim BIN(1, p)$ 0<p<1; q =1- p	$f(x) = p^x q^{1-x}$ x = 0,1	p	pq	$\left(pe^t + q\right)$
Negatif Binomial $X \sim NB(r, p)$ 0<p<1; r = 1,2,...	$f(x) = \binom{x-1}{r-1} p^r q^{x-r}$ x = r, r+1, ...	$\frac{r}{p}$	$\frac{rq}{p^2}$	$\left(\frac{pe^t}{1-qe^t}\right)^r$
Geometric $X \sim GEO(p)$ 0<p<1; q =1- p	$f(x) = pq^{x-1}$ x = 1,2, ...	$\frac{1}{p}$	$\frac{q}{p^2}$	$\frac{pe^t}{1-qe^t}$
Hypergeometric $X \sim HYP(n, M, N)$ n = 1,2, ..., N M = 0,1, ..., N	$f(x) = \frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$; x =0,1, ..., n	$\frac{nM}{N}$	$\frac{nM}{N}\left(1-\frac{M}{N}\right)\left(\frac{N-n}{N-1}\right)$	-
Poisson $X \sim POI(\mu)$ μ > 0	$f(x) = \frac{e^{-\mu}\mu^x}{x!}$; x = 0,1, ...	μ	μ	$e^{\mu\left(e^t-1\right)}$
Diskret Uniform $X \sim DU(N)$ N = 1,2, ...	$f(x) = \frac{1}{N}$; x = 1,2, ..., N	$\frac{N+1}{2}$	$\frac{N^2-1}{12}$	$\frac{1}{N}\frac{e^t - e^{(N+1)t}}{1-e^t}$
Uniform $X \sim UNIF(a, b)$ $a < b$	$f(x) = \frac{1}{b-a}$; $a <x< b$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{bt} - e^{at}}{(b-a)t}$
Nomal $X \sim N(\mu, \sigma^2)$ $\sigma^2 > 0$	$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	μ	σ^2	$e^{\mu t + \frac{\sigma^2 t^2}{2}}$
Gamma $X \sim GAM(\theta, \kappa)$ θ > 0 , κ > 0	$f(x) = \frac{1}{\theta^\kappa \Gamma(\kappa)} x^{\kappa-1} e^{-\frac{x}{\theta}}$; $x > 0$	$\kappa\theta$	$\kappa\theta^2$	$\left(\frac{1}{1-\theta\, t}\right)^\kappa$

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Exponential $X \sim EXP(\theta)$ $\theta > 0$	$f(x) = \frac{1}{\theta} e^{-\frac{x}{\theta}} \quad ; x > 0$	θ	θ^2	$\frac{1}{1-\theta t}$
Exponential (dua parameter) $X \sim EXP(\theta, \eta)$ $\theta > 0$	$f(x) = \frac{1}{\theta} e^{-\left(\frac{x-\eta}{\theta}\right)} \quad ; x > 0$	$\eta + \theta$	θ^2	$\frac{e^{\eta t}}{1-\theta t}$
Doublel Exponential $X \sim DE(\theta, \eta)$, $\theta > 0$	$f(x) = \frac{1}{2\theta} e^{-\left\|\frac{x-\eta}{\theta}\right\|} \quad ; x > 0$	η	$2\theta^2$	$\frac{e^{\eta t}}{1-\theta^2 t^2}$
Weibull $X \sim WEI(\theta, \beta)$ $\theta > 0$; $\beta > 0$	$f(x) = \frac{\beta}{\theta^\beta} x^{\beta-1} e^{-\left(\frac{x}{\theta}\right)^\beta} \; ; \; x > 0$	$\theta\Gamma\left(1+\frac{1}{\beta}\right)$	$\theta^2\left[\Gamma\left(1+\frac{2}{\beta}\right) - \Gamma^2\left(1+\frac{1}{\beta}\right)\right]$	-
Extreme Value $X \sim EV(\theta, \eta)$ $\theta > 0$	$f(x) = \frac{1}{\theta} \exp\left\{\left[\frac{x-\eta}{\theta}\right] - \exp\left[\frac{x-\eta}{\theta}\right]\right\}$	$\eta - \gamma\theta$ $\gamma = 0{,}5772$ Euler' s Konstanta	$\frac{\pi^2\theta^2}{6}$	$e^{\eta t}\Gamma(1+\theta t)$
Cauchy $X \sim CAU(\theta, \eta)$ $\theta > 0$	$f(x) = \frac{1}{\theta\pi\left\{1+\left(\frac{x-\eta}{\theta}\right)^2\right\}}$	-	-	-
Pareto $X \sim PAR(\theta, \kappa)$ $\theta > 0$; $\kappa > 0$	$f(x) = \frac{\kappa}{\theta\left(1+\frac{x}{\theta}\right)^{\kappa+1}} \quad ; x > 0$	$\frac{\theta}{\kappa-1}$ $\kappa > 1$	$\frac{\theta^2\kappa}{(\kappa-2)(\kappa-1)^2}; \kappa > 2$	-
Chi-Square $X \sim \chi^2(v)$ $v = 1,2, \ldots$	$f(x) = \frac{1}{2^{v/2}\Gamma\left(v/2\right)} x^{\frac{v}{2}-1} e^{-\frac{x}{2}} \quad ; x > 0$	v	$2v$	$\left(\frac{1}{1-2t}\right)^{\frac{v}{2}}$
Student's t $X \sim t(v)$ $v = 1,2, \ldots$	$f(x) = \frac{\Gamma\left(\frac{v+1}{2}\right)}{\Gamma\left(\frac{v}{2}\right)} \frac{1}{\sqrt{v\pi}} \left(1+\frac{x^2}{v}\right)^{-\frac{v+1}{2}}$	0 $v > 1$	$\frac{v}{v-2}$ $v > 2$	-
Snedecor's F $X \sim F(v_1, v_2)$ $v_1 = 1,2, \ldots$; $v_1 = 1,2, \ldots$	$f(x) = \frac{\Gamma\left(\frac{v_1+v_2}{2}\right)}{\Gamma\left(\frac{v_1}{2}\right)\Gamma\left(\frac{v_2}{2}\right)} \left(\frac{v_1}{v_2}\right)^{\frac{v_1}{2}} x^{\frac{v_1}{2}-1} \times \left(1+\frac{v_1}{v_2}x\right)^{-\frac{v_1+v_2}{2}}$	$\frac{v_2}{v_2-2}$ $v_2 > 2$	$\frac{2v_2^2(v_1+v_2-2)}{v_1(v_2-2)^2(v_2-4)}$ $v_2 > 4$	-

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Beta $X \sim BETA(a,b)$ $a > 0; b > 0$	$f(x) = \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)} x^{a-1}(1-x)^{b-1}$ $0 < x < 1$	$\frac{a}{a+b}$	$\frac{ab}{(a+b+1)(a+b)^2}$	-