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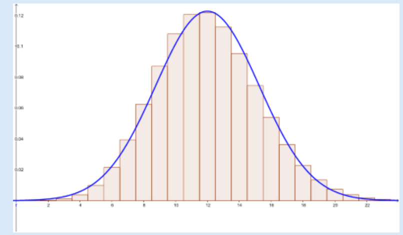
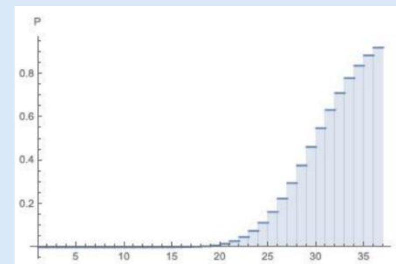
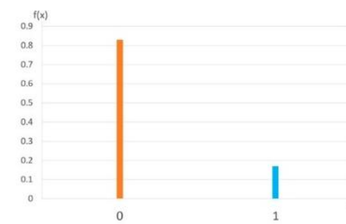
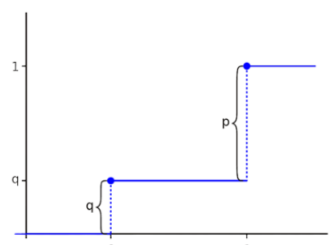
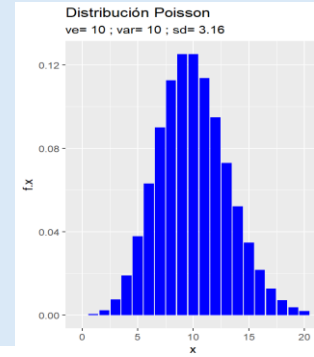
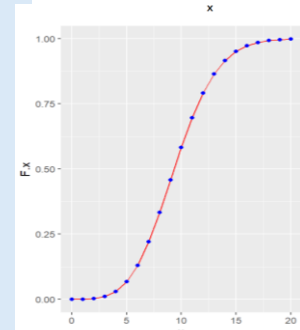
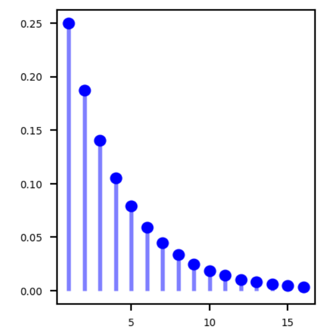
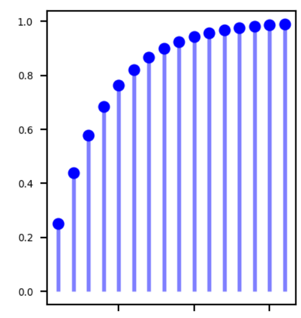
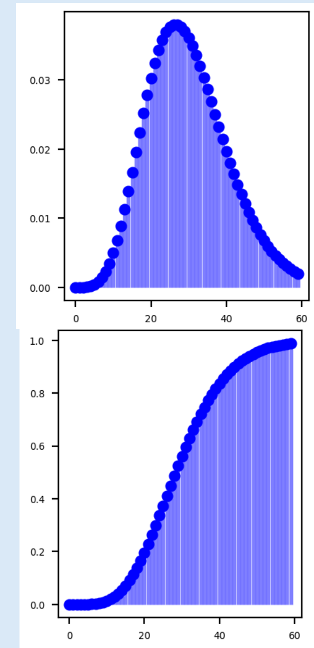
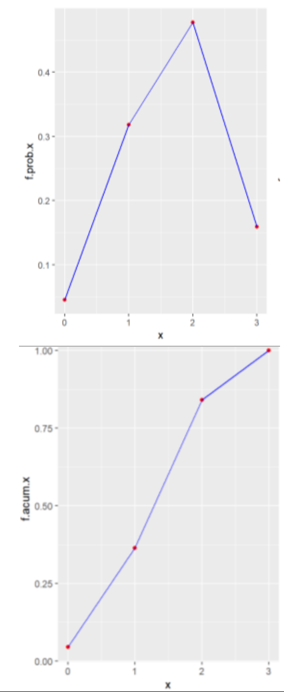
DISTRIBUCIONES DE PROBABILIDAD

DISTRIBUCIÓN	NOMENCLATURA $X \sim$	FUNCIÓN DE PROBABILIDAD $P(X=x)$	MEDIA $E[x]$	VARIANZA (σ^2) Y DESVIACIÓN ESTÁNDAR (σ)	FUNCIÓN GENERADORA DE MOMENTOS $M_x(t) = E(e^{tX})$	GRÁFICAS (DENSIDAD Y ACUMULADA)
BINOMIAL **(Discreta)**	$B(n,p)$ n = número de ensayos p = probabilidad de éxito	**Densidad** $\binom{n}{k} p^k (1-p)^{n-k}$ $k = 0,1,2,\dots,n$ **Acumulativa** $\sum_{i=0}^{k} \binom{n}{i} p^i (1-p)^{n-i}$	np	$\sigma^2 = npq$ $\sigma = \sqrt{npq}$	$(1-p+pe^t)^n$	 
BERNOULLI **(Discreta)**	$Bernoulli(p)$ $0 \le p \le 1$ $p = P(x=1)$ $q = P(X=0)$	**Densidad** $p^x(1-p)^{1-x}$ $x \in [0,1]$ **Acumulativa** $\begin{cases} 0 & x<0 \\ 1-p & 0 \le x < 1 \\ 1 & x \ge 1 \end{cases}$	p	$\sigma^2 = p(1-p)$ $\sigma = \sqrt{p(1-p)}$	$(1-p)+pe^t$	 

DISTRIBUCIONES DE PROBABILIDAD

POISSON **(Discreta)**	$X \sim Poisson(\lambda)$ $\lambda > 0$: promedio de eventos por intervalo X: número de eventos en un intervalo	**Densidad** $\frac{e^{-\lambda}\lambda^k}{k!}$ $k = 0,1,2,\ldots$ **Acumulativa** $\sum_{i=0}^{k} \frac{e^{-\lambda}\lambda^i}{i!}$	λ	$\sigma^2 = \lambda$ $\sigma = \sqrt{\lambda}$	$e^{\lambda(e^t - 1)}$	 
GEOMÉTRICA **(Discreta)**	$Geom(p)$ p : probabilidad de éxito	**Densidad** $(1-p)^{k-1}p$ $k = 1,2,3,\ldots$ **Acumulativa** $1-(1-p)^k$	$\frac{1}{p}$	$\sigma^2 = \frac{1-p}{p^2}$ $\sigma = \sqrt{\frac{1-p}{p^2}}$	$\frac{pe^t}{1-(1-p)e^t}$	 

DISTRIBUCIONES DE PROBABILIDAD

BINOMIAL NEGATIVA **(Discreta)**	$NegBin(r,p)$ $r > 0$: número de éxitos deseados p =probabilidad de éxito X:número de ensayos necesarios para lograr r éxitos	**Densidad** $\binom{k-1}{r-1} p^r (1-p)^{k-r}$ $k = r, r+1, r+2, \ldots$ **Acumulativa** $\sum_{i=r}^{k} \binom{i-1}{r-1} p^r (1-p)^{i-r}$	$\frac{r}{p}$	$\sigma^2 = \frac{r(1-p)}{p^2}$ $\sigma = \sqrt{\frac{r(1-p)}{p^2}}$	$\left(\frac{pe^t}{1-(1-p)e^t}\right)^r$	
HIPER-GEOMÉTRICA **(Discreta)**	$Hypergeo(N,K,n)$ N:tamaño total de la población K:número total de éxitos en la población n:tamaño de la muestra X:número de éxitos en la muestra	**Densidad** $\frac{\binom{K}{k}\binom{N-K}{n-k}}{\binom{N}{n}}$ $\max(0, n-(N-K)) \leq k \leq \min(n, K)$ **Acumulativa** $\sum_{i=\max\{0,t\}}^{k} \frac{\binom{K}{i}\binom{N-K}{n-i}}{\binom{N}{n}}$ $t = n-(N-K)$	$n\frac{K}{N}$	$\sigma^2 = \frac{nK}{N}\frac{N-K}{N}\frac{N-n}{N-1}$ $\sigma = \sqrt{\sigma^2}$	$\sum_k e^{tk} f(x)$	

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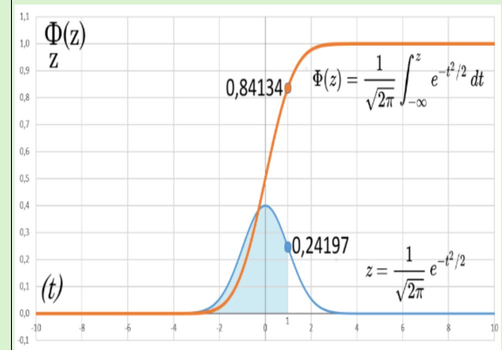
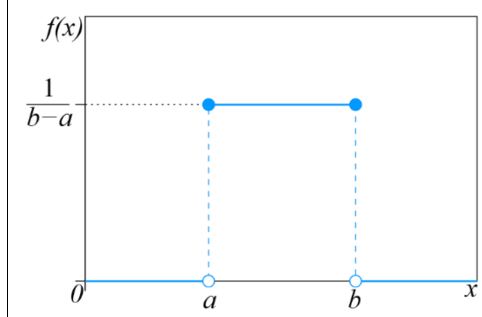
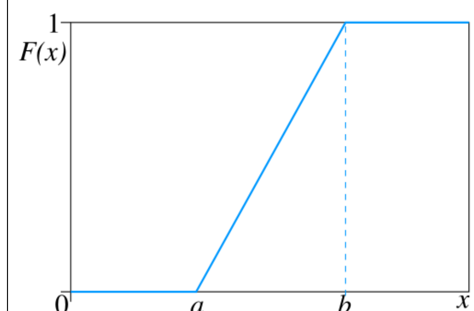
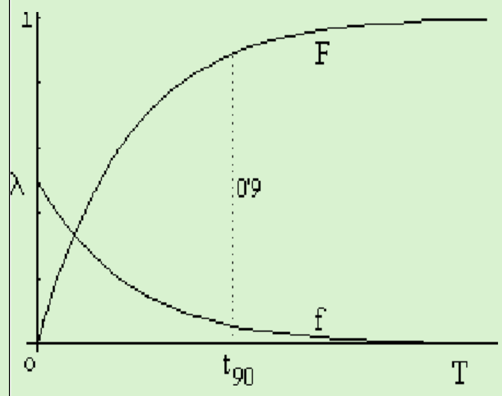
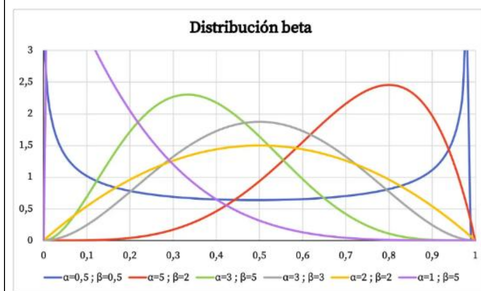
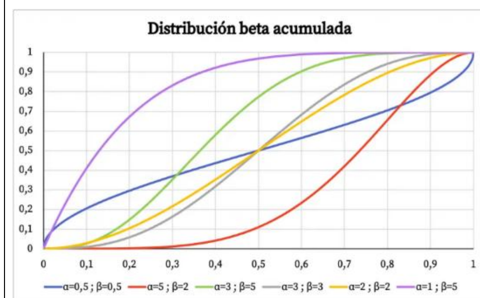
DISTRIBUCIONES DE PROBABILIDAD

NORMAL **(Continua)**	$N(\mu,\sigma^2)$ $\mu: media$ $\sigma^2: varianza$	**Densidad** $\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ $x \in (-\infty,\infty)$ **Acumulativa** $\frac{1}{\sigma\sqrt{2\pi}}\int_{-\infty}^{x} e^{-\frac{(t-\mu)^2}{2\sigma^2}}dt$	μ	σ^2 σ	$e^{(\mu t+\frac{1}{2}\sigma^2t^2)}$	
UNIFORME **(Continua)**	$U(a,b)$ $a: límite\ inferior$ $b: límite\ superior$	**Densidad** $\begin{cases}\frac{1}{b-a}, & a\le x\le b\\ 0, & otro\ caso\end{cases}$ **Acumulativa** $\begin{cases}0 \quad si \quad x<a\\ \frac{x-a}{b-a}, \quad a\le x\le b\\ 1, \quad si \quad x>b\end{cases}$	$\frac{a+b}{2}$	$\sigma^2=\frac{(b-a)^2}{12}$ $\sigma=\frac{b-a}{\sqrt{12}}$	$\frac{e^{tb}-e^{ta}}{t(b-a)}$	

DISTRIBUCIONES DE PROBABILIDAD

EXPONENCIAL **(Continua)**	$Exponencial(\lambda)$ $\lambda > 0$: parámetro de tasa	**Densidad** $\begin{cases} \lambda e^{-\lambda x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$ **Acumulativa** $\begin{cases} 1 - e^{-\lambda x} & x \geq 0 \\ 0 & x < 0 \end{cases}$	$\frac{1}{\lambda}$	$\sigma^2 = \frac{1}{\lambda^2}$ $\sigma = \frac{1}{\lambda}$	$\frac{\lambda}{\lambda - t}$ $t < \lambda$	
BETA **(Continua)**	$Beta(\alpha, \beta)$ $\beta > 0$:parámetro de forma $\alpha > 0$:parámetro de forma	**Densidad** $\frac{1}{\mathrm{B}(\alpha,\beta)} x^{\alpha-1}(1-x)^{\beta-1}$ $0 < x < 1$ $\mathrm{B}(\alpha,\beta) = \frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha+\beta)}$ **Acumulativa** $I_x(\alpha,\beta)$ $I_x(\alpha,\beta)$ es la función beta incompleta regularizada	$\frac{\alpha}{\alpha+\beta}$	$\sigma^2 = \frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$ $\sigma = \sqrt{\sigma^2}$	$\sum_{k=0}^{\infty} \frac{(\alpha)_k}{(\alpha+\beta)_k} \frac{t^k}{k!}$ $(\alpha)_k = \alpha(\alpha+1)(\alpha+2)\ldots.(\alpha+k-1)$ $E[X^k] = \frac{(\alpha)_k}{(\alpha+\beta)_k}$	

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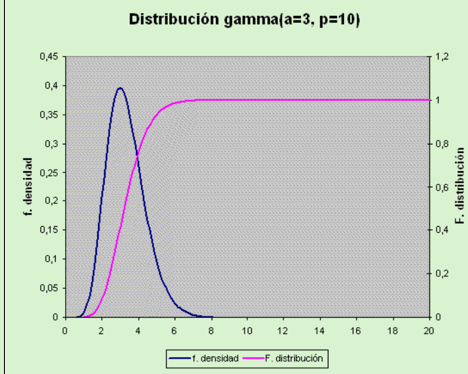
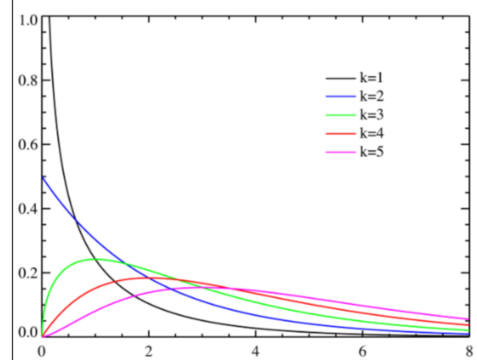
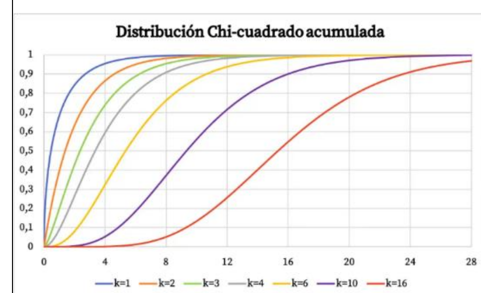
DISTRIBUCIONES DE PROBABILIDAD

GAMMA **(Continua)**	$Gamma(\alpha,\lambda)$ $\lambda > 0$:parámetro de tasa $\alpha > 0$:parámetro de forma	**Densidad** $\begin{cases} \frac{\lambda^{\alpha}}{\Gamma(\alpha)} x^{\alpha-1} e^{-\lambda x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$ $\Gamma(\alpha) = \int_0^{\infty} x^{\alpha-1} e^{-x} dx$ **Acumulativa** $\frac{\gamma(\alpha,\lambda x)}{\Gamma(\alpha)}$	$\frac{\alpha}{\lambda}$	$\sigma^2 = \frac{\alpha}{\lambda^2}$ $\sigma = \frac{\sqrt{\alpha}}{\lambda}$	$\left(\frac{\lambda}{\lambda - t}\right)^{\alpha}$ $t < \lambda$	
CHI-CUADRADA **(Continua)**	$\chi^2(k)$ $k > 0$:grados de libertad	**Densidad** $\frac{1}{2^{\frac{k}{2}}\Gamma\left(\frac{k}{2}\right)} x^{\frac{k}{2}-1} e^{-\frac{x}{2}}$ $x > 0$ **Acumulativa** $\frac{\gamma\left(\frac{k}{2},\frac{x}{2}\right)}{\Gamma\left(\frac{k}{2}\right)}$	k	$\sigma^2 = 2k$ $\sigma = \sqrt{2k}$	$(1-2t)^{-\frac{k}{2}}$ $t < \frac{1}{2}$	 

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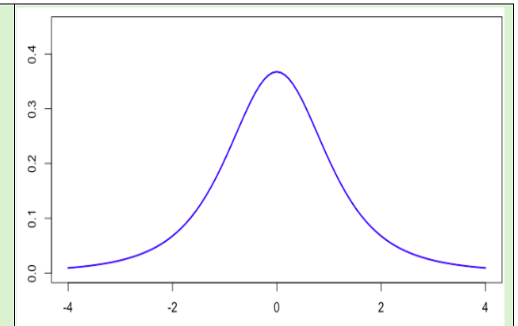
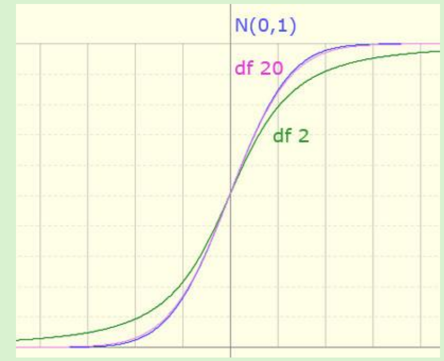
DISTRIBUCIONES DE PROBABILIDAD

T- STUDENT **(Continua)**	$T \sim t(\nu)$ $\nu > 0$: grados de libertad	**Densidad** $\frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\sqrt{\nu\pi}\,\Gamma\left(\frac{\nu}{2}\right)}\left(1+\frac{t^2}{\nu}\right)^{-\frac{\nu+1}{2}}$ $\infty < t < \infty$ **Acumulativa** $\frac{1}{2} + t\frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\sqrt{\nu\pi}\,\Gamma\left(\frac{\nu}{2}\right)}\,{}_2F_1\left(\frac{1}{2},\frac{\nu+1}{2};\frac{3}{2};-\frac{t^2}{\nu}\right)$	$0, si$ $\nu > 1$ no existe, si $\nu \leq 1$	$\sigma^2 = \frac{\nu}{\nu-2}\ si\ \nu > 2$ $no\ existe\ si\ \ \nu \leq\ 2$ $\sigma = \sqrt{\frac{\nu}{\nu-2}}$	La distribución t no tiene función generadora de momentos porque $E[e^{tT}]$ no converge para $t \neq\ 0$	 
F DE FISHER **(Continua)**	$F(\nu_1,\nu_2)$ $\nu_1 > 0$:grados de libertad del numerador $\nu_2 > 0$: grados de libertad del denominador	**Densidad** $\delta\left(\frac{\nu_1}{\nu_2}\right)^{\frac{\nu_1}{2}} x^{\frac{\nu_1}{2}-1}(\gamma)^{-\frac{\nu_1+\nu_2}{2}}$ $\delta = \frac{\Gamma\left(\frac{\nu_1+\nu_2}{2}\right)}{\Gamma\left(\frac{\nu_1}{2}\right)\Gamma\left(\frac{\nu_2}{2}\right)}$ $\gamma = 1+\frac{\nu_1}{\nu_2}x$ $x > 0$ **Acumulativa** $I_{\frac{\nu_1 x}{\nu_1 x+\nu_2}}\left(\frac{\nu_1}{2},\frac{\nu_2}{2}\right)$	$\frac{\nu_2}{\nu_2-2}$ Si $\nu_2 > 2$ No existe, Si $\nu_2 \leq 2$	$\sigma^2 = \frac{2\nu_2^2(\nu_1+\nu_2-2)}{\nu_1(\nu_2-2)^2(\nu_2-4)}$ $si\ \nu_2 > 4$ $\sigma = \sqrt{\sigma^2}$	No posee función generadora de momentos.