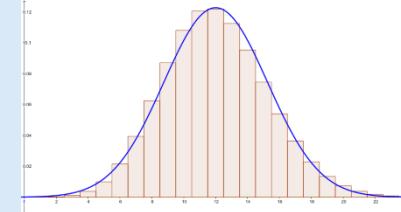
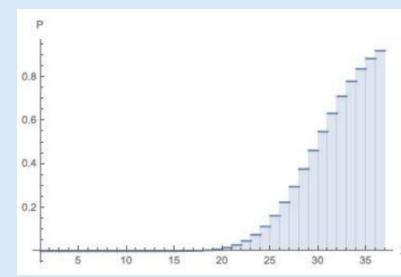
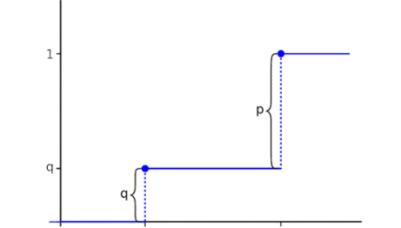
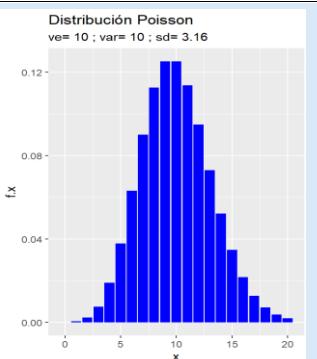
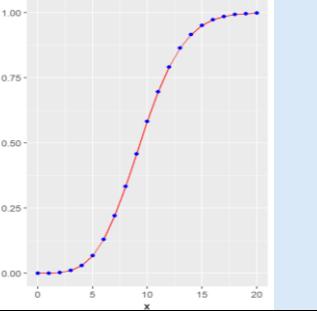
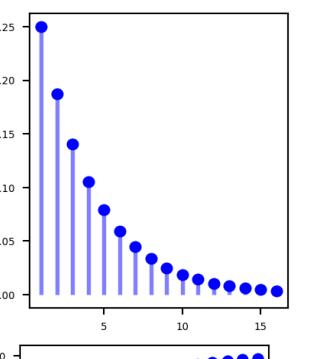
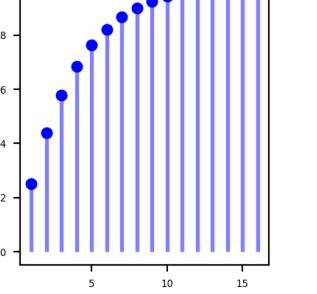


DISTRIBUCIONES DE PROBABILIDAD

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)	$Bernoulli(p)$ $0 \leq p \leq 1$ $p = P(x = 1)$ $q = P(X = 0)$	Densidad $p^x (1-p)^{1-x}$ $x \in [0,1]$ Acumulativa $\begin{cases} 0 & x < 0 \\ 1-p & 0 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$	p	$\sigma^2 = p(1-p)$ $\sigma = \sqrt{p(1-p)}$	$(1 - p) + pe^t$	 

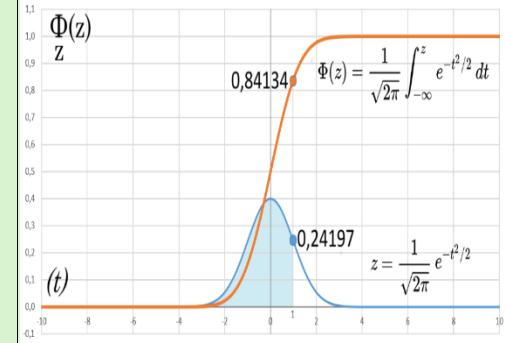
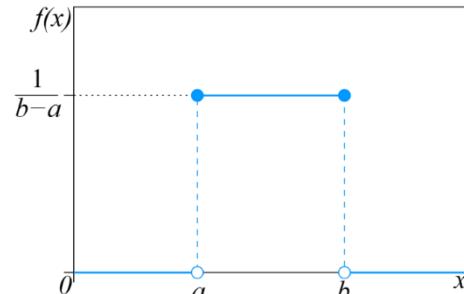
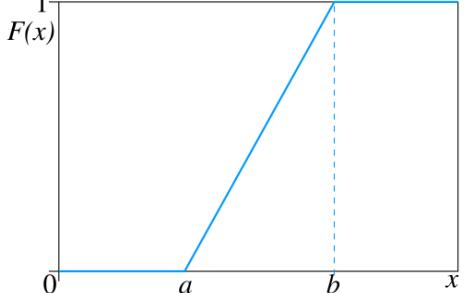
DISTRIBUCIONES DE PROBABILIDAD

POISSON (Discreta)	$X \sim Poisson(\lambda)$ $\lambda > 0$: promedio de eventos por intervalo X : número de eventos en un intervalo	Densidad $\frac{e^{-\lambda} \lambda^k}{k!}$ 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 $(1 - p)^{k-1} p$ $k = 1, 2, 3, \dots$ 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) <p>$NegBin(r, p)$</p> <p>$r > 0$: número de éxitos deseados</p> <p>p = probabilidad de éxito</p> <p>X: número de ensayos necesarios para lograr r éxitos</p>	<p>Densidad</p> ${k-1 \choose r-1} p^r (1-p)^{k-r}$ <p>$k = r, r+1, r+2, \dots$</p> <p>Acumulativa</p> $\sum_{i=r}^k {i-1 \choose r-1} p^r (1-p)^{i-r}$	$\frac{r}{p}$	$\sigma^2 = \frac{r(1-p)}{p^2}$ $\sigma = \sqrt{\frac{r(1-p)}{p^2}}$	$\left(\frac{pe^t}{1 - (1-p)e^t} \right)^r$	
HIPER-GEOMÉTRICA (Discreta) <p>$Hypergeo(N, K, n)$</p> <p>N: tamaño total de la población</p> <p>K: número total de éxitos en la población</p> <p>n: tamaño de la muestra</p> <p>X: número de éxitos en la muestra</p>	<p>Densidad</p> $\frac{{K \choose k} {N-K \choose n-k}}{{N \choose n}}$ <p>$\max(0, n - (N - K)) \leq k \leq \min(n, K)$</p> <p>Acumulativa</p> $\sum_{i=\max\{0,t\}}^k \frac{{K \choose i} {N-K \choose n-i}}{{N \choose n}}$ $t = n - (N - K)$	$n \frac{K}{N}$	$\frac{nK}{N} \frac{\sigma^2}{N} = \frac{N-n}{N} \frac{N-K}{N} \frac{N-n}{N-1}$ $\sigma = \sqrt{\sigma^2}$	$\sum_k e^{tk} f(x)$	

DISTRIBUCIONES DE PROBABILIDAD

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

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 $\frac{1}{B(\alpha, \beta)} x^{\alpha-1} (1-x)^{\beta-1}$ $0 < x < 1$ $B(\alpha, \beta) = \frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha + \beta)}$ Acumulativa $I_x(\alpha, \beta)$ $I_x(\alpha, \beta)$ es la función beta incompleta regularizada	$\frac{\alpha}{\alpha + \beta}$	$\sigma^2 = \frac{\alpha\beta}{(\alpha + \beta)^2(\alpha + \beta + 1)}$ $\sigma = \sqrt{\sigma^2}$	$\sum_{k=0}^{\infty} \frac{(\alpha)_k}{(\alpha + \beta)_k} \frac{t^k}{k!}$ $(\alpha)_k = \alpha(\alpha + 1)(\alpha + 2) \dots (\alpha + k - 1)$ $E[X^k] = \frac{(\alpha)_k}{(\alpha + \beta)_k}$	

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 $\frac{\gamma(\alpha, \lambda x)}{\Gamma(\alpha)}$	$\frac{\alpha}{\lambda}$	$\sigma^2 = \frac{\alpha}{\lambda^2}$ $\sigma = \frac{\sqrt{\alpha}}{\lambda}$	$\left(\frac{\lambda}{\lambda - t}\right)^\alpha$ $t < \lambda$	<p style="text-align: center;">Distribución gamma($\alpha=3, p=10$)</p> <p>The graph shows two curves: a blue curve for the density function f and a magenta curve for the cumulative distribution function F. The x-axis ranges from 0 to 20, and the y-axis ranges from 0 to 1.2. The density curve peaks at approximately x=3. The cumulative distribution curve starts at 0 and approaches 1 as x increases.</p>
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	$\sigma^2 = 2k$ $\sigma = \sqrt{2k}$	$(1 - 2t)^{-\frac{k}{2}}$ $t < \frac{1}{2}$	<p>The top graph shows five curves for different degrees of freedom $k=1, 2, 3, 4, 5$ on the interval [0, 8]. As k increases, the peak of the density curve shifts to the right and its height decreases. The bottom graph shows the cumulative distribution functions for $k=1, 2, 3, 4, 6, 10, 16$ on the interval [0, 28]. The curves start at (0,0) and approach 1 as x increases, with higher k values reaching 1 faster.</p> <p style="text-align: center;">Distribución Chi-cuadrado acumulada</p>

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 $\frac{1}{2} + t \frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\sqrt{\nu\pi}\Gamma\left(\frac{\nu}{2}\right)^2} F_1\left(\frac{1}{2}, \frac{\nu+1}{2}; \frac{3}{2}; -\frac{t^2}{\nu}\right)$	$0, si \nu > 1$ $no existe, si \nu \leq 1$	$\sigma^2 = \frac{\nu}{\nu-2}$ si $\nu > 2$ <i>no existe si $\nu \leq 2$</i> $\sigma = \sqrt{\frac{\nu}{\nu-2}}$	<p>La distribución t no tiene función generadora de momentos porque $E[e^{tT}]$ no converge para $t \neq 0$</p>	
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 $\nu_2 > 4$ $\sigma = \sqrt{\sigma^2}$	<p>No posee función generadora de momentos.</p>	