Datos no agrupados	Datos agrupados	Covarianza
$\bar{x} = \sum_{i=1}^{n} \frac{x_i}{n}$	$\bar{x} = \frac{1}{n}\sum_{i=1}^{k} f_i m_i$	$S_{xy} = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})$ $r = \frac{S_{xy}}{S_x S_y}$
$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$	$s^2 = \frac{1}{n-1}\sum_{i=1}^{k} f_i (m_i - \bar{x})^2$	
$R = X_{(n)} - X_{(1)}$	$\tilde{x} = L_i + \frac{\frac{n}{2} - F_{i-1}}{f_i} \cdot a_i$	**Probabilidad**
Diagrama de cajas $RIC = Q_3 - Q_1$ $L_{sup} = Q_3 + 1.5RIC$ $L_{inf} = Q_1 - 1.5RIC$	$Mo = L_i + \frac{f_i - f_{i-1}}{(f_i - f_{i-1}) + (f_i - f_{i+1})} \cdot a_i$ $AC = \frac{X_{(n)} - X_{(1)}}{k}$; AC: Ancho de clase	$P(E) = \frac{n(E)}{n(\Omega)}$ $P(B\|A) = \frac{P(B \cap A)}{P(A)}$ $P(A) = \sum_{i=1}^{k} P(B_i)P(A\|B_i)$ $P(B_r\|A) = \frac{P(B_r)P(A\|B_r)}{\sum_{i=1}^{k} P(B_i)P(A\|B_i)}$

Variables aleatorias

$f(x) \geq 0$		Momento con respecto al origen	
Discretas	**Continuas**	**Discretas**	**Continuas**
$\sum_x f(x) = 1$ $F(x) = \sum_{t \leq x} f(t)$	$\int_{-\infty}^{\infty} f(x)\,dx = 1$ $F(x) = \int_{-\infty}^{x} f(t)\,dt$	$E(x^r) = \sum_x x^r f(x)$	$E(x^r) = \int_{-\infty}^{\infty} x^r f(x)\,dx$
		Momento con respecto a la media	
		$\mu_r = \sum_x (X - \mu)^r f(x)$	
		$\sigma^2 = E(x^2) - E^2(x)\,; E(x^2) = \int_{-\infty}^{\infty} x^2 f(x)\,dx$	

Modelos aleatorios discretos

Distribución Binomial

$X \sim B(n,p)$

$P(X = x) = \binom{n}{x} p^x (1-p)^{n-x}$

$E(X) = np\ ;\ V(X) = np(1-p)$

Distribución Geométrica

$X \sim G(p)$

$P(X = x) = p(1-p)^{x-1}$

$E(X) = \frac{1}{p}\ ;\ V(X) = \frac{1-p}{p^2}$

Distribución Binomial Negativa

$X \sim BN(k,p)$

$P(X = x) = \binom{x-1}{k-1} p^k (1-p)^{x-k}$

$E(X) = \frac{k}{p}\ ;\ V(X) = \frac{k(1-p)}{p^2}$

Distribución Hipergeométrica

$X \sim H(N,n,k)$

$P(X = x) = \frac{\binom{k}{x}\binom{N-k}{n-x}}{\binom{N}{n}}$

$E(X) = \frac{nk}{N}\ ;\ V(X) = \frac{N-n}{N-1}\left(\frac{nk}{N}\right)\left(1 - \frac{k}{N}\right)$

Distribución Poisson

$X \sim P(\lambda)$

$P(X = x) = \frac{e^{-\lambda}\lambda^x}{x!}$

$E(X) = \lambda\ ;\ V(X) = \lambda$

Modelos aleatorios continuos

Distribución Uniforme

$X \sim U(a,b)$

$f(x) = \frac{1}{b-a}; a \leq X \leq b$

$E(X) = \frac{a+b}{2}\ ;\ V(X) = \frac{(b-a)^2}{12}$

Distribución Normal

$X \sim N(\mu,\sigma)$

$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$

Distribución normal estándar

$X \sim N(0,1)$

$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$

$Z = \frac{x-\mu}{\sigma}$; estandarización

Distribución Gamma

$X \sim G(\alpha,\beta)$

$f(x) = \frac{1}{\beta^\alpha \Gamma(\alpha)} x^{\alpha-1} e^{-\frac{x}{\beta}}$

$E(X) = \alpha\beta\ ;\ V(X) = \alpha\beta^2$

$\Gamma(n) = (n-1)!\ ; \Gamma(\alpha) = (\alpha-1)\Gamma(\alpha-1)$

Distribución Exponencial

$X \sim E(\beta)$

$f(x) = \frac{1}{\beta} e^{-\frac{x}{\beta}}$

$E(X) = \beta\ ;\ V(X) = \beta^2$

Distribución Chi Cuadrado

$X \sim G\left(\alpha = \frac{v}{2}, \beta = 2\right)$

$f(x) = \frac{1}{2^{\frac{v}{2}}\Gamma(\frac{v}{2})} x^{\frac{v}{2}-1} e^{-\frac{x}{2}}$

$E(X) = v\ ;\ V(X) = 2v$

Distribución Beta

Función Beta

$$B(\alpha,\beta) = \int_0^\infty t^{\alpha-1}(1-t)^{\beta-1}dt = \frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha+\beta)}$$

$$f(x) = \frac{x^{\alpha-1}(1-x)^{\beta-1}}{B(\alpha,\beta)}$$

$$E(X) = \frac{\alpha}{\alpha+\beta} \qquad V(X) = \frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$$

Distribuciones Conjuntas

Condicionales	Marginales	Esperanza conjunta
$f(y\|x) = \dfrac{f(x,y)}{f(x)}$ $f(x\|y) = \dfrac{f(x,y)}{f(y)}$	$f(x) = \sum_y f(x,y)$ $\quad f(y) = \sum_x f(x,y)$ $f(x) = \int_y f(x,y)dy$ $\quad f(y) = \int_x f(x,y)dx$	$E(xy) = \sum_x \sum_y xyf(x,y)$ $E(xy) = \int_y \int_x xyf(x,y)\,dxdy$
	Independencia	**Esperanza condicionada**
	$f(x,y) = f(x)f(y)$	$E(X\|Y=y) = \sum_x x\,f(x\|y)$ $E(X\|Y=y) = \int_x xf(x\|y)dx$
Correlación	**Covarianza**	
$\rho_{x,y} = \dfrac{\sigma_{xy}}{\sigma_x \sigma_y}$	$Cov(X,Y) = \sigma_{xy} = E(XY) - E(X)E(Y)$	

Estimaciones (Intervalos de confianza)

Media (n > 30)	Media (n < 30)	Proporción	Varianza
$\bar{X} \pm \dfrac{\sigma}{\sqrt{n}} z_{\frac{\alpha}{2}}$	$\bar{X} \pm \dfrac{s}{\sqrt{n}} t_{\frac{\alpha}{2}}$	$\hat{p} \pm \sqrt{\dfrac{\hat{p}\hat{q}}{n}} Z_{\frac{\alpha}{2}}$	$\dfrac{(n-1)s^2}{\chi^2_{\alpha/2}} < \sigma^2 < \dfrac{(n-1)s^2}{\chi^2_{1-\alpha/2}}$

Prueba de hipótesis

Una sola media	Dos medias
$Z = \dfrac{\bar{X} - \mu_0}{\sigma/\sqrt{n}}$ $\quad t = \dfrac{\bar{X} - \mu_0}{s/\sqrt{n}}$	$Z = \dfrac{(\bar{X}_1 - \bar{X}_2) - d_0}{\sqrt{\left(\sigma_1^2/n_1\right) + \left(\sigma_2^2/n_2\right)}}$ $\quad Z = \dfrac{(\bar{X}_1 - \bar{X}_2) - d_0}{\sigma\sqrt{\left(1/n_1\right) + \left(1/n_2\right)}}$
Pruebas pareadas	
$t = \dfrac{\bar{d} - d_0}{s_d/\sqrt{n}}$	$t = \dfrac{(\bar{X}_1 - \bar{X}_2) - d_0}{S_p\sqrt{\left(1/n_1\right) + \left(1/n_2\right)}}$ $\quad S_p^2 = \dfrac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}$
Una proporción	
$Z = \dfrac{\hat{p} - p_0}{\sqrt{p_0 q_0/n}} = \dfrac{X - np_0}{\sqrt{np_0 q_0}}$	
Dos proporciones	
$Z = \dfrac{(\hat{p}_1 - \hat{p}_2) - d_0}{\sqrt{\left(p_1 q_1/n_1\right) + \left(p_2 q_2/n_2\right)}}$	$t' = \dfrac{(\bar{X}_1 - \bar{X}_2) - d_0}{\sqrt{\left(s_1^2/n_1\right) + \left(s_2^2/n_2\right)}}$ $\quad \nu = \dfrac{\left(s_1^2/n_1 + s_2^2/n_2\right)^2}{\dfrac{\left(s_1^2/n_1\right)^2}{n_1 - 1} + \dfrac{\left(s_2^2/n_2\right)^2}{n_2 - 1}}$
Igualdad de varianzas	
$F = s_1^2/s_2^2$	

Pruebas Ji-Cuadrado

Independencia	$\boldsymbol{e_{ij} = \dfrac{r_i * c_j}{n}}$	$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\dfrac{(o_{ij} - e_{ij})^2}{e_{ij}}$	$\nu = (r-1)(c-1)$
Bondad de ajuste	$e_i = n * p_i$	$\chi^2 = \sum_{i=1}^{k}\dfrac{(o_i - e_i)^2}{e_i}$	$\nu = (k-1)$
Kolmogorov	Smirnov $D = max\|F_n(x) - F_0(x)\|$		

Regresión Lineal

$$b_1 = \frac{n\sum_{i=1}^{n} x_i\, y_i - \left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)}{n\sum_{i=1}^{n} {x_i}^2 - \left(\sum_{i=1}^{n} x_i\right)^2} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

$$b_0 = \frac{\sum_{i=1}^{n} y_i - b_1\sum_{i=1}^{n} x_i}{n} = \bar{y} - b_1\bar{x}$$