FORMULARIO DE ESTADÍSTICA

MODELOS DE PROBABILIDAD

Nombre	Símbolo	$p(x)=P(X=x)$; $F(x)=P(X\le x)$; $f(x)=\dfrac{\partial F(x)}{\partial x}$	Media μ	Varianza σ^2
Bernoulli	$B(p)$	$p(x)=p^x q^{1-x}; x=0,1$	p	pq
Binomial	$B(n,p)$	$p(x)=\binom{n}{x} p^x q^{n-x}; x=0,1,...,n$	np	npq
Geométrica	$G(p)$	$p(x)=pq^{x-1}; x=1,2,...$	$\dfrac{1}{p}$	$\dfrac{q}{p^2}$
Poisson	$P(\lambda)$	$p(x)=\dfrac{\lambda^x e^{-\lambda}}{x!}; x=0,1,...$	λ	λ
Uniforme continua en (a,b)	$U(a,b)$	$f(x)=1/(b-a); a\le x\le b$	$\dfrac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exponencial	$\mathrm{Exp}(\lambda)$	$f(x)=\lambda e^{-\lambda x}; x>0$ $F(x)=1-e^{-\lambda x}; x>0$	$1/\lambda$	$1/\lambda^2$
Normal	$N(\mu,\sigma^2)$	$f(x)=\dfrac{1}{\sqrt{2\pi\sigma^2}} e^{-\dfrac{(x-\mu)^2}{2\sigma^2}}; x\in\Re$	μ	σ^2

REGRESIÓN SIMPLE

$$\hat{y}=a+bx$$

$$a=\bar{y}-b\bar{x}$$

$$b=\frac{s_{x,y}}{s_x^2}=\frac{\hat{s}_{x,y}}{\hat{s}_x^2}$$

INFERENCIA PARA UNA POBLACIÓN

Población	Contraste de hipótesis	Estadístico de contraste	Región de rechazo (p-valor $<\alpha$)	Intervalo de confianza $\mathrm{IC}_{1-\alpha}$
Cualquier v.a. X con $E[X]=\mu$, $\mathrm{Var}[X]=\sigma^2$ y $n\to\infty$	(1) $\mathrm{H}_0:\mu=\mu_0$; $\mathrm{H}_1:\mu\neq\mu_0$ (2) $\mathrm{H}_0:\mu\ge\mu_0$; $\mathrm{H}_1:\mu<\mu_0$ (3) $\mathrm{H}_0:\mu\le\mu_0$; $\mathrm{H}_1:\mu>\mu_0$	(a) $z_0=\dfrac{\bar{x}-\mu_0}{\sigma/\sqrt{n}}$ (b) $t_0=\dfrac{\bar{x}-\mu_0}{\hat{s}/\sqrt{n}}$	(1a) $\lvert z_0\rvert>z_{\alpha/2}$ (1b) $\lvert t_0\rvert>z_{\alpha/2}$ (2a) $z_0<-z_\alpha$ (2b) $t_0<-z_\alpha$ (3a) $z_0>z_\alpha$ (3b) $t_0>z_\alpha$	$\mu\in\left(\bar{x}\mp z_{\alpha/2}\sigma/\sqrt{n}\right)$ $\mu\in\left(\bar{x}\mp z_{\alpha/2}\hat{s}/\sqrt{n}\right)$
Normal $N(\mu,\sigma^2)$	(1)$\mathrm{H}_0:\mu=\mu_0$; $\mathrm{H}_1:\mu\neq\mu_0$ (2)$\mathrm{H}_0:\mu\ge\mu_0$; $\mathrm{H}_1:\mu<\mu_0$ (3)$\mathrm{H}_0:\mu\le\mu_0$; $\mathrm{H}_1:\mu>\mu_0$	(a) $z_0=\dfrac{\bar{x}-\mu_0}{\sigma/\sqrt{n}}$ (b) $t_0=\dfrac{\bar{x}-\mu_0}{\hat{s}/\sqrt{n}}$	(1a) $\lvert z_0\rvert>z_{\alpha/2}$ (1b) $\lvert t_0\rvert>t_{n-1;\alpha/2}$ (2a) $z_0<-z_\alpha$ (2b) $t_0<-t_{n-1;\alpha}$ (3a) $z_0>z_\alpha$ (3b) $t_0>t_{n-1;\alpha}$	$\mu\in\left(\bar{x}\mp z_{\alpha/2}\sigma/\sqrt{n}\right)$ $\mu\in\left(\bar{x}\mp t_{n-1;\alpha/2}\hat{s}/\sqrt{n}\right)$
Bernoulli $B(p)$ con $n\to\infty$	(1) $\mathrm{H}_0:p=p_0$; $\mathrm{H}_1:p\neq p_0$ (2) $\mathrm{H}_0:p\ge p_0$; $\mathrm{H}_1:p<p_0$ (3) $\mathrm{H}_0:p\le p_0$; $\mathrm{H}_1:p>p_0$	$z_0=\dfrac{\hat{p}-p_0}{\sqrt{p_0q_0/n}}$	(1) $\lvert z_0\rvert>z_{\alpha/2}$ (2) $z_0<-z_\alpha$ (3) $z_0>z_\alpha$	$p\in\left(\hat{p}\mp z_{\alpha/2}\sqrt{\dfrac{\hat{p}\hat{q}}{n}}\right)$
Normal $N(\mu,\sigma^2)$	(1) $\mathrm{H}_0:\sigma^2=\sigma_0^2$; $\mathrm{H}_1:\sigma^2\neq\sigma_0^2$ (2) $\mathrm{H}_0:\sigma^2\ge\sigma_0^2$; $\mathrm{H}_1:\sigma^2<\sigma_0^2$ (3) $\mathrm{H}_0:\sigma^2\le\sigma_0^2$; $\mathrm{H}_1:\sigma^2>\sigma_0^2$	$\chi_0^2=\dfrac{(n-1)\hat{s}^2}{\sigma_0^2}=\dfrac{ns^2}{\sigma_0^2}$	(1) $\chi_0^2>\chi^2_{n-1;\alpha/2}$ ó $\chi_0^2<\chi^2_{n-1;1-\alpha/2}$ (2) $\chi_0^2<\chi^2_{n-1;1-\alpha}$ (3) $\chi_0^2>\chi^2_{n-1;\alpha}$	$\sigma^2\in\left(\dfrac{(n-1)\hat{s}^2}{\chi^2_{n-1;\alpha/2}};\dfrac{(n-1)\hat{s}^2}{\chi^2_{n-1;1-\alpha/2}}\right)$
Cualquier v.a. X con $\widehat{\theta}_{MV}$ y $n\to\infty$	(1) $\mathrm{H}_0:\theta=\theta_0$; $\mathrm{H}_1:\theta\neq\theta_0$ (2) $\mathrm{H}_0:\theta\ge\theta_0$; $\mathrm{H}_1:\theta<\theta_0$ (3) $\mathrm{H}_0:\theta\le\theta_0$; $\mathrm{H}_1:\theta>\theta_0$	$t_0=\dfrac{\hat{\theta}_{MV}-\theta_0}{\sqrt{\widehat{\mathrm{Var}}(\hat{\theta}_{MV})}}$ $\widehat{\mathrm{Var}}(\hat{\theta}_{MV})=-\left(\dfrac{\partial^2 L(\hat{\theta}_{MV})}{\partial\theta^2}\right)^{-1}$	(1) $\lvert t_0\rvert>z_{\alpha/2}$ (2) $t_0<-z_\alpha$ (3) $t_0>z_\alpha$	$\theta\in\left(\hat{\theta}_{MV}\mp z_{\alpha/2}\sqrt{\widehat{\mathrm{Var}}(\hat{\theta}_{MV})}\right)$

INFERENCIA PARA DOS POBLACIONES			
Dos poblaciones o v.a. X_1, X_2	Contraste de hipótesis	Estadístico de contraste	Región de rechazo (p-valor $< \alpha$)
Cualesquiera con $E(X_1)=\mu_1,\ E(X_2)=\mu_2$ $\mathrm{Var}(X_1)=\sigma_1^2$ $\mathrm{Var}(X_2)=\sigma_2^2$	(1) $\mathrm{H}_0 : \mu_1=\mu_2$; $\mathrm{H}_1 : \mu_1 \neq \mu_2$ (2) $\mathrm{H}_0 : \mu_1 \geq \mu_2$; $\mathrm{H}_1 : \mu_1 < \mu_2$ (3) $\mathrm{H}_0 : \mu_1 \leq \mu_2$; $\mathrm{H}_1 : \mu_1 > \mu_2$	$(a)\ z_0=\dfrac{\bar{x}_1-\bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}}$ $\quad (b)\ t_0=\dfrac{\bar{x}_1-\bar{x}_2}{\sqrt{\frac{\hat{s}_1^2}{n_1}+\frac{\hat{s}_2^2}{n_2}}}$	(1a) $\lvert z_0\rvert > z_{\alpha/2}$ (1b) $\lvert t_0\rvert > z_{\alpha/2}$ (1b) $\lvert t_0\rvert > t_{\nu;\alpha/2}$ (2a) $z_0 < -z_\alpha$ (2b) $t_0 < -z_\alpha$ (2b) $t_0 < -t_{\nu;\alpha}$ (3a) $z_0 > z_\alpha$ (3b) $t_0 > z_\alpha$ (3b) $t_0 > t_{\nu;\alpha}$ Bajo normalidad o si $n_1, n_2 \to \infty$ · Si $n_1, n_2 \to \infty$ · Bajo normalidad
Datos pareados $D=X_1-X_2$	(1) $\mathrm{H}_0 : \mu_D=0$; $\mathrm{H}_1 : \mu_D \neq 0$ (2) $\mathrm{H}_0 : \mu_D \geq 0$; $\mathrm{H}_1 : \mu_D < 0$ (3) $\mathrm{H}_0 : \mu_D \leq 0$; $\mathrm{H}_1 : \mu_D > 0$	$(a)\ z_0=\dfrac{\bar{d}}{\sigma_D\,/\sqrt{n}}$ $\quad (b)\ t_0=\dfrac{\bar{d}}{\hat{s}_D\,/\sqrt{n}}$	(1a) $\lvert z_0\rvert > z_{\alpha/2}$ (1b) $\lvert t_0\rvert > z_{\alpha/2}$ (1b) $\lvert t_0\rvert > t_{n-1;\alpha/2}$ (2a) $z_0 < -z_\alpha$ (2b) $t_0 < -z_\alpha$ (2b) $t_0 < -t_{n-1;\alpha}$ (3a) $z_0 > z_\alpha$ (3b) $t_0 > z_\alpha$ (3b) $t_0 > t_{n-1;\alpha}$ Bajo normalidad o si $n \to \infty$ · Si $n \to \infty$ · Bajo normalidad
Cualesquiera con $E(X_1)=\mu_1,\ E(X_2)=\mu_2$ $\mathrm{Var}(X_1)=\mathrm{Var}(X_2)=\sigma^2$	(1) $\mathrm{H}_0 : \mu_1=\mu_2$; $\mathrm{H}_1 : \mu_1 \neq \mu_2$ (2) $\mathrm{H}_0 : \mu_1 \geq \mu_2$; $\mathrm{H}_1 : \mu_1 < \mu_2$ (3) $\mathrm{H}_0 : \mu_1 \leq \mu_2$; $\mathrm{H}_1 : \mu_1 > \mu_2$	$(a)\ z_0=\dfrac{\bar{x}_1-\bar{x}_2}{\sigma\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$ $\quad (b)\ t_0=\dfrac{\bar{x}_1-\bar{x}_2}{\hat{s}_T\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$ con $\hat{s}_T^2=\frac{(n_1-1)\hat{s}_1^2+(n_2-1)\hat{s}_2^2}{n_1+n_2-2}$	(1a) $\lvert z_0\rvert > z_{\alpha/2}$ (1b) $\lvert t_0\rvert > z_{\alpha/2}$ (1b)$\lvert t_0\rvert > t_{n_1+n_2-2;\alpha/2}$ (2a) $z_0 < -z_\alpha$ (2b) $t_0 < -z_\alpha$ (2b) $t_0 < -t_{n_1+n_2-2;\alpha}$ (3a) $z_0 > z_\alpha$ (3b) $t_0 > z_\alpha$ (3b)$t_0 > t_{n_1+n_2-2;\alpha}$ Bajo normalidad o si $n_1, n_2 \to \infty$ · Si $n_1, n_2 \to \infty$ · Bajo normalidad
v.a. de Bernoulli $X_1 \sim B(p_1),\ X_2 \sim B(p_2)$	(1) $\mathrm{H}_0 : p_1=p_2$; $\mathrm{H}_1 : p_1 \neq p_2$ (2) $\mathrm{H}_0 : p_1 \geq p_2$; $\mathrm{H}_1 : p_1 < p_2$ (3) $\mathrm{H}_0 : p_1 \leq p_2$; $\mathrm{H}_1 : p_1 > p_2$	$z_0=\dfrac{\hat{p}_1-\hat{p}_2}{\sqrt{\hat{p}_0\hat{q}_0\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$ con $\hat{p}_0=\dfrac{n_1\hat{p}_1+n_2\hat{p}_2}{n_1+n_2}$	(1) $\lvert z_0\rvert > z_{\alpha/2}$ (2) $z_0 < -z_\alpha$ (3) $z_0 > z_\alpha$ Si $n_1, n_2 \to \infty$
v.a. Normales $X_1 \sim N\left(\mu_1, \sigma_1^2\right)$ $X_2 \sim N\left(\mu_2, \sigma_2^2\right)$	(1) $\mathrm{H}_0 : \sigma_1^2=\sigma_2^2$; $\mathrm{H}_1 : \sigma_1^2 \neq \sigma_2^2$ (2) $\mathrm{H}_0 : \sigma_1^2 \geq \sigma_2^2$; $\mathrm{H}_1 : \sigma_1^2 < \sigma_2^2$ (3) $\mathrm{H}_0 : \sigma_1^2 \leq \sigma_2^2$; $\mathrm{H}_1 : \sigma_1^2 > \sigma_2^2$	$F_0=\dfrac{\hat{s}_1^2}{\hat{s}_2^2}$	(1) $F_0 > F_{n_1-1;n_2-1;\alpha/2}$ ó $F_0 < F_{n_1-1;n_2-1;1-\alpha/2}$ donde $F_{n_1-1;n_2-1;1-\alpha/2}=1\,/F_{n_2-1;n_1-1;\alpha/2}$ (2) $F_0 < F_{n_1-1;n_2-1;1-\alpha}$ (3) $F_0 > F_{n_1-1;n_2-1;\alpha}$

Dos poblaciones o v.a. X_1, X_2	Parámetro	Intervalo de confianza $\mathrm{IC}_{1-\alpha}$
Cualesquiera con $E(X_1)=\mu_1,\ E(X_2)=\mu_2$ $\mathrm{Var}(X_1)=\sigma_1^2$ $\mathrm{Var}(X_2)=\sigma_2^2$	$\mu_1-\mu_2$	$\mu_1-\mu_2 \in \left(\bar{x}_1-\bar{x}_2 \mp z_{\alpha/2}\sqrt{\dfrac{\sigma_1^2}{n_1}+\dfrac{\sigma_2^2}{n_2}}\right)$ Bajo normalidad o si $n_1, n_2 \to \infty$ $\mu_1-\mu_2 \in \left(\bar{x}_1-\bar{x}_2 \mp z_{\alpha/2}\sqrt{\dfrac{\hat{s}_1^2}{n_1}+\dfrac{\hat{s}_2^2}{n_2}}\right)$ Si $n_1, n_2 \to \infty$ $\mu_1-\mu_2 \in \left(\bar{x}_1-\bar{x}_2 \mp t_{\nu;\alpha/2}\sqrt{\dfrac{\hat{s}_1^2}{n_1}+\dfrac{\hat{s}_2^2}{n_2}}\right)$ con $\nu \approx \dfrac{\left(\frac{\hat{s}_1^2}{n_1}+\frac{\hat{s}_2^2}{n_2}\right)^2}{\frac{1}{n_1-1}\left(\frac{\hat{s}_1^2}{n_1}\right)^2+\frac{1}{n_2-1}\left(\frac{\hat{s}_2^2}{n_2}\right)^2}$ Bajo normalidad
Cualesquiera con $E(X_1)=\mu_1,\ E(X_2)=\mu_2$ $\mathrm{Var}(X_1)=\mathrm{Var}(X_2)=\sigma^2$	$\mu_1-\mu_2$	$\mu_1-\mu_2 \in \left(\bar{x}_1-\bar{x}_2 \mp z_{\alpha/2}\sigma\sqrt{\dfrac{1}{n_1}+\dfrac{1}{n_2}}\right)$ Bajo normalidad o si $n_1, n_2 \to \infty$ $\mu_1-\mu_2 \in \left(\bar{x}_1-\bar{x}_2 \mp z_{\alpha/2}\hat{s}_T\sqrt{\dfrac{1}{n_1}+\dfrac{1}{n_2}}\right)$ Si $n_1, n_2 \to \infty$ $\mu_1-\mu_2 \in \left(\bar{x}_1-\bar{x}_2 \mp t_{n_1+n_2-2;\alpha/2}\hat{s}_T\sqrt{\dfrac{1}{n_1}+\dfrac{1}{n_2}}\right)$ Bajo normalidad
v.a. de Bernoulli $X_1 \sim B(p_1), X_2 \sim B(p_2)$	p_1-p_2	$p_1-p_2 \in \left(\hat{p}_1-\hat{p}_2 \mp z_{\alpha/2}\sqrt{\dfrac{\hat{p}_1\hat{q}_1}{n_1}+\dfrac{\hat{p}_2\hat{q}_2}{n_2}}\right)$ Si $n_1, n_2 \to \infty$
v.a. Normales $X_1 \sim N\left(\mu_1, \sigma_1^2\right)$ $X_2 \sim N\left(\mu_2, \sigma_2^2\right)$	$\dfrac{\sigma_1^2}{\sigma_2^2}$	$\dfrac{\sigma_1^2}{\sigma_2^2} \in \left(\dfrac{\hat{s}_1^2}{\hat{s}_2^2}F_{n_2-1;n_1-1;1-\alpha/2};\ \dfrac{\hat{s}_1^2}{\hat{s}_2^2}F_{n_2-1;n_1-1;\alpha/2}\right)$ donde $F_{n_2-1;n_1-1;1-\alpha/2}=1\,/F_{n_1-1;n_2-1;\alpha/2}$