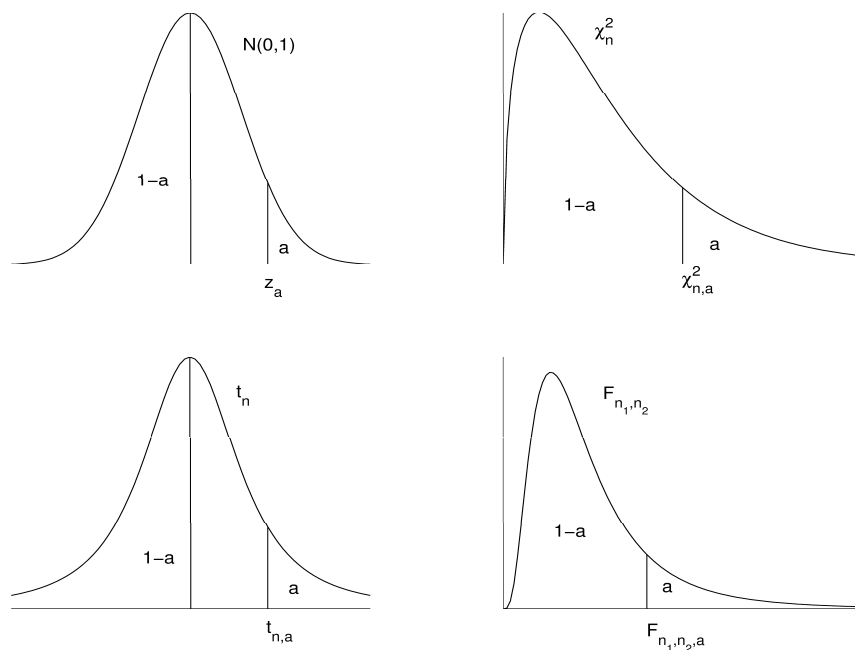




## INTERVALOS DE CONFIANZA

NOTACIÓN:

$(X_1, \dots, X_n)$  muestra aleatoria (m. a.) de  $X$ .

$$\bar{x} = \frac{1}{n} \sum x_i \quad s^2 = \frac{1}{n-1} \sum (x_i - \bar{x})^2$$

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

Intervalos de confianza  $1 - \alpha$  para  $\mu$ :

a)  $\sigma$  conocida:  $I = \left( \bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \right)$

b)  $\sigma$  desconocida:  $I = \left( \bar{x} \pm t_{n-1; \alpha/2} \frac{s}{\sqrt{n}} \right)$

Intervalo de confianza  $1 - \alpha$  para  $\sigma^2$ :

$$I = \left( \frac{(n-1)s^2}{\chi^2_{n-1; \alpha/2}}, \frac{(n-1)s^2}{\chi^2_{n-1; 1-\alpha/2}} \right)$$

2)  $X \sim \text{Bernoulli}(p)$  (muestras grandes).

Intervalo de confianza  $1 - \alpha$  para  $p$ :  $I = \left( \bar{x} \pm z_{\alpha/2} \sqrt{\frac{\bar{x}(1-\bar{x})}{n}} \right)$

3)  $X \sim \text{Poisson}(\lambda)$  (muestras grandes).

Intervalo de confianza  $1 - \alpha$  para  $\lambda$ :  $I = \left( \bar{x} \pm z_{\alpha/2} \sqrt{\bar{x}/n} \right)$

4) Dos poblaciones Normales (muestras independientes).

$(X_1, \dots, X_m)$  m. a. de  $X \sim N(\mu_1, \sigma_1)$ ; se calcula  $\bar{x}$  y  $s_1^2$ .

$(Y_1, \dots, Y_n)$  m. a. de  $Y \sim N(\mu_2, \sigma_2)$ ; se calcula  $\bar{y}$  y  $s_2^2$ .

$$s_p^2 = \frac{(m-1)s_1^2 + (n-1)s_2^2}{m+n-2}$$

Intervalos de confianza  $1 - \alpha$  para  $\mu_1 - \mu_2$ :

a)  $\sigma_1, \sigma_2$  conocidas:

$$I = \left( \bar{x} - \bar{y} \pm z_{\alpha/2} \sqrt{\frac{\sigma_1^2}{m} + \frac{\sigma_2^2}{n}} \right)$$

b)  $\sigma_1, \sigma_2$  desconocidas,  $\sigma_1 = \sigma_2$ :

$$I = \left( \bar{x} - \bar{y} \pm t_{m+n-2; \alpha/2} s_p \sqrt{\frac{1}{m} + \frac{1}{n}} \right)$$

c)  $\sigma_1, \sigma_2$  desconocidas,  $\sigma_1 \neq \sigma_2$ :

$$I = \left( \bar{x} - \bar{y} \pm t_{f; \alpha/2} \sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}} \right)$$

donde  $f$  = entero más próximo a  $\frac{(s_1^2/m + s_2^2/n)^2}{\frac{(s_1^2/m)^2}{m-1} + \frac{(s_2^2/n)^2}{n-1}}$

Intervalo de confianza  $1 - \alpha$  para  $\sigma_1^2/\sigma_2^2$ :

$$I = \left( \frac{s_1^2/s_2^2}{F_{m-1; n-1; \alpha/2}}, \frac{s_1^2/s_2^2}{F_{m-1; n-1; 1-\alpha/2}} \right)$$

5) Comparación de proporciones (muestras grandes e independientes).

$(X_1, \dots, X_m)$  m. a. de  $X \sim \text{Bernoulli}(p_1)$ .

$(Y_1, \dots, Y_n)$  m. a. de  $Y \sim \text{Bernoulli}(p_2)$ .

Intervalo de confianza  $1 - \alpha$  para  $p_1 - p_2$ :

$$I = \left( \bar{x} - \bar{y} \pm z_{\alpha/2} \sqrt{\frac{\bar{x}(1-\bar{x})}{m} + \frac{\bar{y}(1-\bar{y})}{n}} \right)$$

## CONTRASTES DE HIPÓTESIS

NOTACION:

$\alpha$  = nivel de significación del contraste.

$n$  = tamaño de la muestra.

$H_0$  = hipótesis nula.

$R$  = región crítica o de rechazo de  $H_0$ .

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

$$H_0 : \mu = \mu_0 \text{ (}\sigma \text{ conocida); } R = \left\{ |\bar{x} - \mu_0| > z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \right\}$$

$$H_0 : \mu = \mu_0 \text{ (}\sigma \text{ desconocida); } R = \left\{ |\bar{x} - \mu_0| > t_{n-1; \alpha/2} \frac{s}{\sqrt{n}} \right\}$$

$$H_0 : \mu \leq \mu_0 \text{ (}\sigma \text{ conocida); } R = \left\{ \bar{x} - \mu_0 > z_{\alpha} \frac{\sigma}{\sqrt{n}} \right\}$$

$$H_0 : \mu \leq \mu_0 \text{ (}\sigma \text{ desconocida); } R = \left\{ \bar{x} - \mu_0 > t_{n-1; \alpha} \frac{s}{\sqrt{n}} \right\}$$

$$H_0 : \mu \geq \mu_0 \text{ (}\sigma \text{ conocida); } R = \left\{ \bar{x} - \mu_0 < z_{1-\alpha} \frac{\sigma}{\sqrt{n}} \right\}$$

$$H_0 : \mu \geq \mu_0 \text{ (}\sigma \text{ desconocida); } R = \left\{ \bar{x} - \mu_0 < t_{n-1; 1-\alpha} \frac{s}{\sqrt{n}} \right\}$$

$$H_0 : \sigma = \sigma_0; \quad R = \left\{ \frac{n-1}{\sigma_0^2} s^2 \notin \left( \chi_{n-1; 1-\alpha/2}^2, \chi_{n-1; \alpha/2}^2 \right) \right\}$$

$$H_0 : \sigma \leq \sigma_0; \quad R = \left\{ \frac{n-1}{\sigma_0^2} s^2 > \chi_{n-1; \alpha}^2 \right\}$$

$$H_0 : \sigma \geq \sigma_0; \quad R = \left\{ \frac{n-1}{\sigma_0^2} s^2 < \chi_{n-1; 1-\alpha}^2 \right\}$$

2)  $X \sim \text{Bernoulli}(p)$  (muestras grandes)

$$H_0 : p = p_0; \quad R = \left\{ |\bar{x} - p_0| > z_{\alpha/2} \sqrt{\frac{p_0(1-p_0)}{n}} \right\}$$

$$H_0 : p \leq p_0; \quad R = \left\{ \bar{x} - p_0 > z_{\alpha} \sqrt{\frac{p_0(1-p_0)}{n}} \right\}$$

$$H_0 : p \geq p_0; \quad R = \left\{ \bar{x} - p_0 < z_{1-\alpha} \sqrt{\frac{p_0(1-p_0)}{n}} \right\}$$

3)  $X \sim \text{Poisson}(\lambda)$  (muestras grandes)

$$H_0 : \lambda = \lambda_0; \quad R = \left\{ |\bar{x} - \lambda_0| > z_{\alpha/2} \sqrt{\lambda_0/n} \right\}$$

$$H_0 : \lambda \leq \lambda_0; \quad R = \left\{ \bar{x} - \lambda_0 > z_{\alpha} \sqrt{\lambda_0/n} \right\}$$

$$H_0 : \lambda \geq \lambda_0; \quad R = \left\{ \bar{x} - \lambda_0 < z_{1-\alpha} \sqrt{\lambda_0/n} \right\}$$

4) Dos poblaciones Normales (muestras independientes).

$(X_1, \dots, X_m)$  m. a. de  $X \sim N(\mu_1, \sigma_1)$ ; se calcula  $\bar{x}$  y  $s_1^2$ .

$(Y_1, \dots, Y_n)$  m. a. de  $Y \sim N(\mu_2, \sigma_2)$ ; se calcula  $\bar{y}$  y  $s_2^2$ .

$$s_p^2 = \frac{(m-1)s_1^2 + (n-1)s_2^2}{m+n-2}$$

$$H_0 : \mu_1 = \mu_2 \ (\sigma_1, \sigma_2 \text{ conocidas}); \quad R = \left\{ |\bar{x} - \bar{y}| > z_{\alpha/2} \sqrt{\frac{\sigma_1^2}{m} + \frac{\sigma_2^2}{n}} \right\}$$

$$H_0 : \mu_1 = \mu_2 \ (\sigma_1 = \sigma_2); \quad R = \left\{ |\bar{x} - \bar{y}| > t_{m+n-2; \alpha/2} s_p \sqrt{\frac{1}{m} + \frac{1}{n}} \right\}$$

$$H_0 : \mu_1 = \mu_2 \ (\sigma_1 \neq \sigma_2); \quad R = \left\{ |\bar{x} - \bar{y}| > t_{f; \alpha/2} \sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}} \right\}$$

$$H_0 : \mu_1 \leq \mu_2 \ (\sigma_1, \sigma_2 \text{ conocidas}); \quad R = \left\{ \bar{x} - \bar{y} > z_{\alpha} \sqrt{\frac{\sigma_1^2}{m} + \frac{\sigma_2^2}{n}} \right\}$$

$$H_0 : \mu_1 \leq \mu_2 \ (\sigma_1 = \sigma_2); \quad R = \left\{ \bar{x} - \bar{y} > t_{m+n-2; \alpha} s_p \sqrt{\frac{1}{m} + \frac{1}{n}} \right\}$$

$$H_0 : \mu_1 \leq \mu_2 \ (\sigma_1 \neq \sigma_2); \quad R = \left\{ \bar{x} - \bar{y} > t_{f; \alpha} \sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}} \right\}$$

$$H_0 : \mu_1 \geq \mu_2 \ (\sigma_1, \sigma_2 \text{ conocidas}); \quad R = \left\{ \bar{x} - \bar{y} < z_{1-\alpha} \sqrt{\frac{\sigma_1^2}{m} + \frac{\sigma_2^2}{n}} \right\}$$

$$H_0 : \mu_1 \geq \mu_2 \ (\sigma_1 = \sigma_2); \quad R = \left\{ \bar{x} - \bar{y} < t_{m+n-2; 1-\alpha} s_p \sqrt{\frac{1}{m} + \frac{1}{n}} \right\}$$

$$H_0 : \mu_1 \geq \mu_2 \ (\sigma_1 \neq \sigma_2); \quad R = \left\{ \bar{x} - \bar{y} < t_{f; 1-\alpha} \sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}} \right\}$$

$$H_0 : \sigma_1 = \sigma_2; \quad R = \left\{ s_1^2/s_2^2 \notin (F_{m-1; n-1; 1-\alpha/2}, F_{m-1; n-1; \alpha/2}) \right\}$$

$$H_0 : \sigma_1 \leq \sigma_2; \quad R = \left\{ s_1^2/s_2^2 > F_{m-1; n-1; \alpha} \right\}$$

$$H_0 : \sigma_1 \geq \sigma_2; \quad R = \left\{ s_1^2/s_2^2 < F_{m-1; n-1; 1-\alpha} \right\}$$

$$\text{donde } f = \text{entero m\'as pr\'oximo a } \frac{(s_1^2/m + s_2^2/n)^2}{\frac{(s_1^2/m)^2}{m-1} + \frac{(s_2^2/n)^2}{n-1}}$$

5) Comparaci\'on de proporciones (muestras grandes e independientes).

$(X_1, \dots, X_m)$  m. a. de  $X \sim \text{Bernoulli}(p_1)$ .

$(Y_1, \dots, Y_n)$  m. a. de  $Y \sim \text{Bernoulli}(p_2)$ .

$$H_0 : p_1 = p_2; \quad R = \left\{ |\bar{x} - \bar{y}| > z_{\alpha/2} \sqrt{\bar{p}(1-\bar{p}) \left( \frac{1}{m} + \frac{1}{n} \right)} \right\}$$

$$H_0 : p_1 \leq p_2; \quad R = \left\{ \bar{x} - \bar{y} > z_{\alpha} \sqrt{\bar{p}(1-\bar{p}) \left( \frac{1}{m} + \frac{1}{n} \right)} \right\}$$

$$H_0 : p_1 \geq p_2; \quad R = \left\{ \bar{x} - \bar{y} < z_{1-\alpha} \sqrt{\bar{p}(1-\bar{p}) \left( \frac{1}{m} + \frac{1}{n} \right)} \right\}$$

$$\text{donde } \bar{p} = \frac{\sum x_i + \sum y_i}{m+n} = \frac{m\bar{x} + n\bar{y}}{m+n}$$