

Tablas de Probabilidades

Ernesto Barrios Zamudio

José Ángel García Pérez

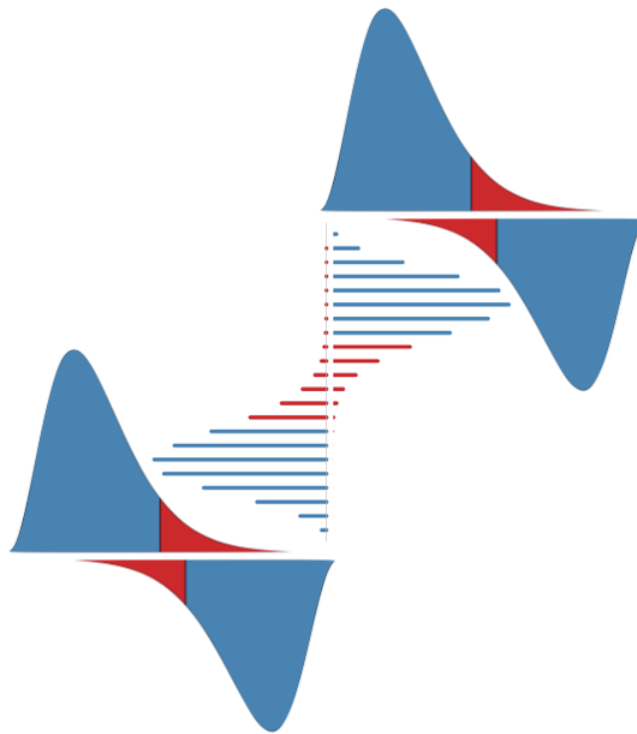
José Matuk Villazón

Departamento Académico de Estadística

Instituto Tecnológico Autónomo de México

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Notas

La idea de elaborar unas tablas de probabilidades surgió del afán de uniformar las tablas empleadas dentro de un mismo curso y entre distintos cursos. Para esto se construyeron las tablas de los cursos Estadística I, Estadística II e Inferencia Estadística, con el mismo contenido de las empleadas oficialmente. Se incluyeron los mismos formularios y distribuciones de probabilidad.

Con las primeras versiones de las tablas nos dimos cuenta de las ventajas de contar con el correspondiente documento electrónico. Se puede extraer exclusivamente el material de interés e incluirlo en otro documento.

Así pues, en este trabajo hemos compilado los formularios y las tablas de probabilidades utilizadas en los cursos mencionados y algunas distribuciones más para apoyo de cursos optativos.

El cálculo de las probabilidades y las gráficas fueron generadas utilizando el lenguaje estadístico R. Para algunas distribuciones se programaron los correspondientes algoritmos que en un caso implicó incluso la liga de R con FORTRAN.

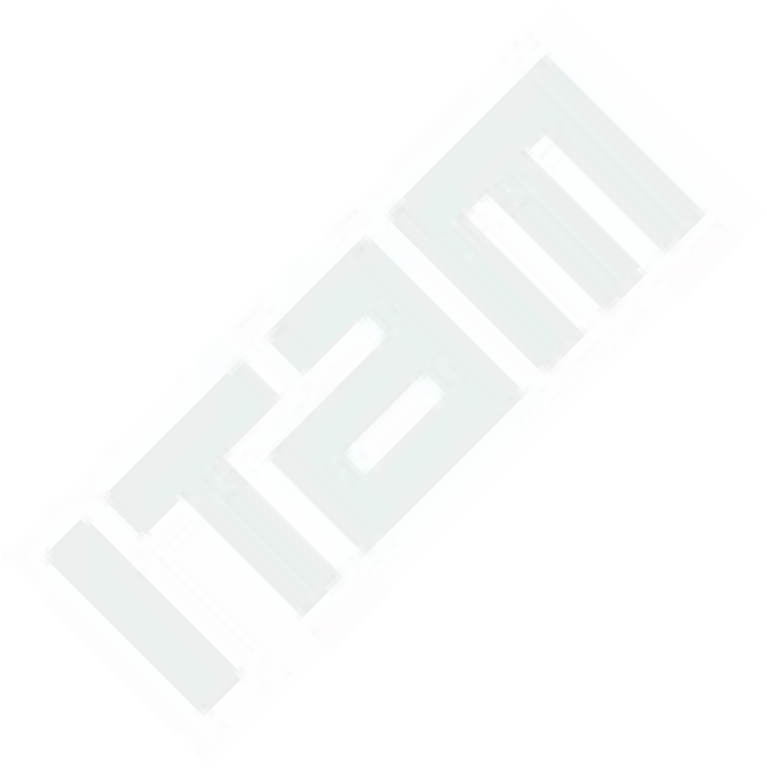
El documento fue preparado con \LaTeX y el uso del paquete-R *xtable*.

Si tiene algún comentario agradeceremos que nos lo haga llegar a: `ebarrios at itam.mx`.

Copia electrónica de este documento y sus actualizaciones las encontrará en <http://allman.rhon.itam.mx/~ebarrios/TablasProbabilidad>

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Parte I

Formularios





1. Estadística I

1.1. Análisis exploratorio de datos

• Datos no agrupados

Medida descriptiva	Población	Muestra
Media	$\mu = \frac{1}{N} \sum_{i=1}^N x_i$	$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$
Mediana*	$\ell(m_d) = 0.5N + 0.5$	$\ell(\tilde{x}) = 0.5n + 0.5$
Cuartil inferior*	$\ell(Q_1) = 0.25N + 0.5$	$\ell(q_1) = 0.25n + 0.5$
Cuartil superior*	$\ell(Q_3) = 0.75N + 0.5$	$\ell(q_3) = 0.75n + 0.5$
Amplitud intercuartílica	$A.I. = Q_3 - Q_1$	$a.i. = q_3 - q_1$
Desviación media a mediana	$D.M. = \frac{1}{N} \sum_{i=1}^N |x_i - m_d|$	$d.m. = \frac{1}{n-1} \sum_{i=1}^n |x_i - \tilde{x}|$
Varianza	$\sigma^2 = \frac{1}{N} \sum_{i=1}^N (x_i - \mu_x)^2$ $= \frac{1}{N} \sum_{i=1}^N x_i^2 - N\mu^2$	$s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$ $= \frac{1}{n-1} \left(\sum_{i=1}^n x_i^2 - n\bar{x}^2 \right)$
Coefficiente de variación	$C.V. = \frac{\sigma}{\mu}$	$c.v. = \frac{s}{\bar{x}}$
Covarianza	$\sigma_{xy} = \frac{1}{N} \sum_{i=1}^N (x_i - \mu_X)(y_i - \mu_Y)$ $= \frac{1}{N} \sum_{i=1}^N x_i y_i - \mu_X \mu_Y$	$s_{xy} = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})$ $= \frac{1}{n-1} \left(\sum_{i=1}^n x_i y_i - n\bar{x}\bar{y} \right)$
Coefficiente de correlación	$\rho = \frac{\sigma_{xy}}{\sigma_x \sigma_y}$	$r = \frac{s_{xy}}{s_x s_y}$

x_i : i -ésima observación de la variable X .

N : número de elementos en la población.

n : número de observaciones en la muestra.

$\ell(q)$: posición o índice de q , redondeado.

m_d : mediana poblacional.

\tilde{x} : mediana muestral.

* Determinadas por la l -ésima observación de la población o muestra ordenada.

• Datos agrupados

Medida descriptiva	Población	Muestra
Media	$\mu = \frac{1}{N} \sum_{i=1}^k f_i m_i$	$\bar{x} = \frac{1}{n} \sum_{i=1}^k f_i m_i$
Mediana	$m_d = A + \frac{0.5 - C}{D}(B - A)$	$\tilde{x} = A + \frac{0.5 - C}{D}(B - A)$
Desviación media a mediana	$D.M. = \frac{1}{N} \sum_{i=1}^k f_i |m_i - m_d|$	$d.m. = \frac{1}{n-1} \sum_{i=1}^k f_i |m_i - \tilde{x}|$
Varianza	$\sigma^2 = \frac{1}{N} \sum_{i=1}^k f_i (m_i - \mu)^2$ $= \frac{1}{N} \sum_{i=1}^k f_i m_i^2 - N^2 \mu^2$	$s^2 = \frac{1}{n-1} \sum_{i=1}^k f_i (m_i - \bar{x})^2$ $= \frac{1}{n-1} \sum_{i=1}^k f_i m_i^2 - n^2 \bar{x}^2$

f_i : frecuencia absoluta de la i -ésima clase.

k : número de clases en la distribución de frecuencias.

m_i : marca de la i -ésima clase.

A : frontera inferior del intervalo de clase que contiene a la mediana.

B : frontera superior del intervalo de clase que contiene a la mediana.

C : frecuencia relativa acumulada hasta la clase anterior a la que contiene a la mediana.

D : frecuencia relativa de la clase que contiene a la mediana.

1.2. Variables aleatorias

• Esperanza, varianza y covarianza

	Discretas	Continuas
$\mu = E(X)$	$\sum_{x \in R_X} x P(X = x)$	$\int_{R_X} x f_X(x) dx$
$\sigma^2 = \text{var}(X)$	$\sum_{x \in R_X} (x - \mu)^2 P(X = x)$	$\int_{R_X} (x - \mu)^2 f_X(x) dx$
$\sigma_{XY} = \text{Cov}(X, Y)$	$\sum_{x \in R_X} \sum_{y \in R_Y} xy P(X = x, Y = y)$ $- \sum_{x \in R_X} x P(X = x) \sum_{y \in R_Y} y P(Y = y)$	$\int_{R_X} \int_{R_Y} xy f(x, y) dy dx$ $- \int_{R_X} x f_X(x) dx \int_{R_Y} y f_Y(y) dy$

• Propiedades

$E(aX + b) = aE(X) + b$ $\text{var}(X) = E[(X - E(X))^2]$ $= E(X^2) - E(X)^2$ $\text{var}(aX + bY) = a^2\text{var}(X) + b^2\text{var}(Y)$ $+ 2ab\text{Cov}(X, Y)$	$\text{Cov}(X, Y) = E[(X - E(X))(Y - E(Y))]$ $= E(XY) - E(X)E(Y)$ $\text{Cov}(aX + b, cY + d) = ac\text{Cov}(X, Y)$ $\rho = \text{Corr}(X, Y) = \frac{\sigma_{XY}}{\sigma_X \sigma_Y}$
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1.3. Algunas distribuciones de probabilidad

Distribución	Notación	Soporte R_X	Función de probabilidad	$E(X)$	$\text{var}(X)$
Uniforme discreta	$\text{Unif}\{x_1, \dots, x_K\}$	$x \in \{x_1, \dots, x_K\}$	$\frac{1}{K}$	$\frac{1}{K} \sum_{i=1}^K x_i$	$\frac{1}{K} \sum_{i=1}^K (x_i - E(X))^2$
Bernoulli	$\text{Be}(p)$	$x \in \{0, 1\}$	$p^x(1-p)^{1-x}$	p	$p(1-p)$
Binomial	$\text{Bin}(n, p)$	$x \in \{0, 1, \dots, n\}$	$\binom{n}{x} p^x(1-p)^{n-x}$	np	$np(1-p)$
Poisson	$\text{Po}(\lambda)$	$x \in \{0, 1, 2, \dots\}$	$\frac{\lambda^x e^{-\lambda}}{x!}$	λ	λ
Uniforme continua	$\text{Unif}(a, b)$	$a \leq x \leq b$	$\frac{1}{b-a}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Normal	$N(\mu, \sigma^2)$	$-\infty < x < \infty$	$\frac{1}{\sigma\sqrt{2\pi}} \exp\left\{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right\}$	μ	σ^2
Exponencial	$\text{Exp}(\theta)$	$0 \leq x < \infty$	$\frac{1}{\theta} \exp\left\{-\frac{x}{\theta}\right\}$	θ	θ^2



2. Estadística II

2.1. Algunas distribuciones de probabilidad

Distribución	Notación	Soporte R_X	Función de probabilidad	$E(X)$	$\text{var}(X)$
Uniforme discreta	$\text{Unif}\{x_1, \dots, x_K\}$	$x \in \{x_1, \dots, x_K\}$	$\frac{1}{K}$	$\frac{1}{K} \sum_{i=1}^K x_i$	$\frac{1}{K} \sum_{i=1}^K (x_i - E(X))^2$
Bernoulli	$\text{Be}(p)$	$x \in \{0, 1\}$	$p^x (1-p)^{1-x}$	p	$p(1-p)$
Binomial	$\text{Bin}(n, p)$	$x \in \{0, 1, \dots, n\}$	$\binom{n}{x} p^x (1-p)^{n-x}$	np	$np(1-p)$
Poisson	$\text{Po}(\lambda)$	$x \in \{0, 1, 2, \dots\}$	$\frac{\lambda^x e^{-\lambda}}{x!}$	λ	λ
Uniforme continua	$\text{Unif}(a, b)$	$a \leq x \leq b$	$\frac{1}{b-a}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Normal	$N(\mu, \sigma^2)$	$-\infty < x < \infty$	$\frac{1}{\sigma\sqrt{2\pi}} \exp\left\{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right\}$	μ	σ^2
Exponencial	$\text{Exp}(\theta)$	$0 \leq x < \infty$	$\frac{1}{\theta} \exp\{-\frac{x}{\theta}\}$	θ	θ^2

2.2. Estimación puntual

Parámetro	Estimador	Sesgo	$B(\hat{\theta}) = E(\hat{\theta} - \theta)$
Media	$\bar{X} = \frac{1}{n} \sum X_i$	Error de estimación	$|\hat{\theta} - \theta|$
Varianza	$S^2 = \frac{\sum (X_i - \bar{X})^2}{n-1}$	Error Cuadrático Medio	$ECM(\hat{\theta}) = E((\hat{\theta} - \theta)^2)$
Correlación	$r = \frac{S_{XY}}{S_X S_Y}, \quad S_{XY} = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{n-1}$		$= \text{var}(\hat{\theta}) + B(\hat{\theta})^2$

2.3. Algunos estadísticos y su distribución de muestreo

Poblaciones con distribución normal

Estadístico	Distribución
$Z = \frac{\sqrt{n}(\bar{X} - \mu)}{\sigma}$	$Z \sim N(0, 1)$
$T = \frac{\sqrt{n}(\bar{X} - \mu)}{S}$	$T \sim t_{n-1}$
$Z = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$	$Z \sim N(0, 1)$
$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 + n_2 - 2)}$	$\frac{(n_1 + n_2 - 2)S_p^2}{\sigma^2} \sim \chi_{n_1 + n_2 - 2}^2$
$T = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{S_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$	$T \sim t_{(n_1 + n_2 - 2)}$
$J = \frac{(n - 1)S^2}{\sigma^2}$	$J \sim \chi_{n-1}^2$
$F = \frac{S_1^2/\sigma_1^2}{S_2^2/\sigma_2^2}$	$F \sim F_{(n_1-1, n_2-1)}$
$T = \frac{\sqrt{n}(\bar{D} - \mu_D)}{S_D}, \quad D = X_1 - X_2$	$T \sim t_{n-1}$
$T = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}, \quad r = \frac{S_{XY}}{S_X S_Y}$	$T \sim t_{n-2}$

Poblaciones con distribución Bernoulli

Estadístico	Distribución
$Y = n\hat{p}$	$Y \sim \text{Bin}(n, p)$
$Z = \frac{\hat{p} - p}{\sqrt{p(1-p)/n}}$	$Z \sim N(0, 1)$, para n grande
$Z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\hat{p}_1(1-\hat{p}_1)/n_1 + \hat{p}_2(1-\hat{p}_2)/n_2}}$	$Z \sim N(0, 1)$, para n_1 y n_2 grandes
<p>Si $p_1 = p_2$,</p> $Z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$ <p>con $\hat{p} = \frac{n_1\hat{p}_1 + n_2\hat{p}_2}{n_1 + n_2}$</p>	$Z \sim N(0, 1)$, para n_1 y n_2 grandes

2.4. Pruebas no paramétricas

Prueba	Estadístico	Propiedades
Signos	$M = \#$ de signos positivos	$E(M) = np$, $\text{var}(M) = np(1-p)$
Mann-Whitney	$T_x = \sum R(X_i) - \frac{n(n+1)}{2}$	$E(T_x) = \frac{nm}{2}$, $\text{var}(T_x) = \frac{nm(n+m+1)}{12}$
Correlación de Spearman	$r_s = 1 - \frac{6 \sum d_i^2}{n^3 - n}$	$r_s \sqrt{(n-1)} \sim N(0, 1)$, para n grande
Ji-cuadrada (χ^2)	$J = \sum_{i=1}^{rc} \frac{(\text{Obs}_i - \text{Esp}_i)^2}{\text{Esp}_i}$	$J \sim \chi^2_{(r-1)(c-1)}$, $r = \#$ renglones $c = \#$ columnas



3. Probabilidad, Inferencia Estadística y Econometría

3.1. Variables aleatorias

- Valor esperado de $g(X)$

$$E(g(X)) = \begin{cases} \sum_x g(x)P(X=x) & \text{caso discreto} \\ \int_{-\infty}^{\infty} g(x)f_X(x)dx & \text{caso continuo} \end{cases}$$

- Propiedades de la función generadora de momentos

$$M_{X+a}(t) = e^{at} M_X(t)$$

$$M_{bX}(t) = M_X(bt)$$

$$M_{\frac{X+a}{b}}(t) = e^{\frac{a}{b}t} M_X\left(\frac{t}{b}\right)$$

- Tercer y cuarto momentos con respecto a la media

$$E[(X - \mu)^3] = E(X^3) - 3E(X)E(X^2) + 2(E(X))^3$$

$$E[(X - \mu)^4] = E(X^4) - 4E(X)E(X^3) + 6(E(X))^2E(X^2) - 3(E(X))^4$$

- Coeficientes de asimetría y de curtosis

$$C_A = \alpha_3 = \frac{\mu_3}{\mu_2^{3/2}}$$

$$C_K = \alpha_4 = \frac{\mu_4}{\mu_2^2}$$

- Método de transformación de variables

Sea $U = h(Y)$, con h función monótona creciente o decreciente en y , entonces

$$f_U(u) = f_Y(y) \left| \frac{dy}{du} \right| \quad \text{donde } y = h^{-1}(u)$$

3.2. Distribuciones de probabilidad

Distribución	Notación	Soporte R_X	Función de probabilidad	$E(X)$	$\text{var}(X)$	Función generadora de momentos
Uniforme discreta	$\text{Unif}\{x_1, \dots, x_K\}$	$x \in \{x_1, \dots, x_K\}$	$\frac{1}{K}$	$\frac{1}{K} \sum_{i=1}^K x_i$	$\frac{1}{K} \sum_{i=1}^K (x_i - E(X))^2$	$\frac{1}{K} \sum_i e^{tx_i}$
Bernoulli	$\text{Be}(p)$	$x \in \{0, 1\}$	$p^x (1-p)^{1-x}$	p	$p(1-p)$	$pe^t + (1-p)$
Binomial	$\text{Bin}(n, p)$	$x \in \{0, 1, \dots, n\}$	$\binom{n}{x} p^x (1-p)^{n-x}$	np	$np(1-p)$	$[pe^t + (1-p)]^n$
Poisson	$\text{Po}(\lambda)$	$x \in \{0, 1, 2, \dots\}$	$\frac{\lambda^x e^{-\lambda}}{x!}$	λ	λ	$e^{\lambda(e^t - 1)}$
Uniforme continua	$\text{Unif}(a, b)$	$a \leq x \leq b$	$\frac{1}{b-a}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{tb} - e^{ta}}{t(b-a)}$
Normal	$N(\mu, \sigma^2)$	$-\infty < x < \infty$	$\frac{1}{\sigma\sqrt{2\pi}} \exp\left\{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right\}$	μ	σ^2	$e^{\mu t + \frac{1}{2}\sigma^2 t^2}$
Gama*	$\text{Gama}(\alpha, \beta)$	$x \in \mathcal{R}^+$	$\frac{x^{\alpha-1} e^{-x/\beta}}{\Gamma(\alpha)\beta^\alpha}$	$\alpha\beta$	$\alpha\beta^2$	$(1-\beta t)^{-\alpha}$

* Notas:

- $\Gamma(\alpha) = \int_0^\infty u^{\alpha-1} e^{-u} du$. Entonces,
 $\Gamma(\alpha+1) = \alpha \cdot \Gamma(\alpha)$; $\Gamma(1/2) = \sqrt{\pi}$; $\Gamma(1) = 1$; $\Gamma(n+1) = n!$, para $n = 1, 2, \dots$
- Distribución exponencial: $X \sim \text{Exp}(\lambda)$. Entonces, $X \sim \text{Gama}(1, 1/\lambda)$ y $E(X) = 1/\lambda$.
- Distribución Ji-cuadrada: $Y \sim \chi_n^2$. Entonces, $Y \sim \text{Gama}(n/2, 2)$ y $E(Y) = n$.

3.3. Distribuciones bivariadas

- **Función de densidad condicional**

$$f(x_2|x_1) = \frac{f_{X_1, X_2}(x_1, x_2)}{f_{X_1}(x_1)}$$

- **Valor esperado de $g(X_1, X_2)$**

$$E[g(X_1, X_2)] = \begin{cases} \sum_{x_1} \sum_{x_2} g(x_1, x_2) P(X_1 = x_1, X_2 = x_2) & \text{caso discreto} \\ \int \int g(x_1, x_2) f_{X_1, X_2}(x_1, x_2) dx_1 dx_2 & \text{caso continuo} \end{cases}$$

- **Función generadora de momentos conjunta**

$$M_{X_1, X_2}(t_1, t_2) = E(e^{t_1 X_1 + t_2 X_2})$$

- **Covarianza y coeficiente de correlación**

$$\sigma_{12} = \text{Cov}(X_1, X_2) = E[(X_1 - E(X_1))(X_2 - E(X_2))] = E(X_1 X_2) - E(X_1)E(X_2)$$

$$\rho_{X_1 X_2} = \frac{\sigma_{12}}{\sigma_1 \sigma_2}$$

- **Método de transformación de variables**

Sean las variables aleatorias Y_1 y Y_2 funciones de las variables aleatorias X_1 y X_2 , de manera que las ecuaciones en y_1 y y_2 tienen solución única para x_1 y x_2 en términos de y_1 y y_2 . Esto es,

$$\begin{array}{ll} y_1 = g_1(x_1, x_2) & x_1 = h_1(y_1, y_2) \\ y_2 = g_2(x_1, x_2) & x_2 = h_2(y_1, y_2) \end{array} \quad y$$

Si las funciones h_1 y h_2 tienen derivadas parciales continuas en todos los puntos (y_1, y_2) y el determinante *Jacobiano*

$$J(h_1(y_1, y_2), h_2(y_1, y_2)) = \begin{vmatrix} \frac{\partial h_1}{\partial y_1} & \frac{\partial h_1}{\partial y_2} \\ \frac{\partial h_2}{\partial y_1} & \frac{\partial h_2}{\partial y_2} \end{vmatrix} \neq 0 \quad \text{para todo } (h_1(y_1, y_2), h_2(y_1, y_2))$$

entonces,

$$f_{Y_1, Y_2}(y_1, y_2) = f_{X_1, X_2}(h_1(y_1, y_2), h_2(y_1, y_2)) \cdot |J(h_1(y_1, y_2), h_2(y_1, y_2))|$$

3.4. Distribución normal bivariada

- Función de densidad conjunta

$$f_{X_1, X_2}(x_1, x_2) = \frac{1}{2\pi\sigma_1\sigma_2\sqrt{1-\rho^2}} \exp \left\{ -\frac{1}{2(1-\rho^2)} \left[\left(\frac{x_1 - \mu_1}{\sigma_1} \right)^2 - 2\rho \left(\frac{x_1 - \mu_1}{\sigma_1} \right) \left(\frac{x_2 - \mu_2}{\sigma_2} \right) + \left(\frac{x_2 - \mu_2}{\sigma_2} \right)^2 \right] \right\}$$

- Función generadora de momentos conjunta

$$M_{X_1, X_2}(t_1, t_2) = \exp \left\{ (t_1\mu_1 + t_2\mu_2) + \frac{1}{2} (\sigma_1^2 t_1^2 + 2\rho\sigma_1\sigma_2 t_1 t_2 + \sigma_2^2 t_2^2) \right\}$$

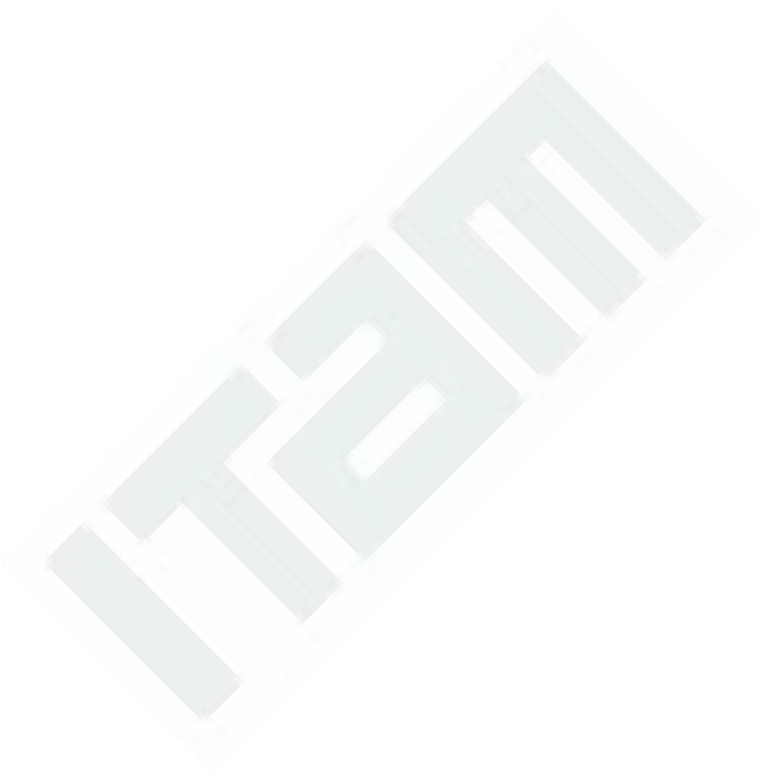
- Valor esperado y varianza condicionales

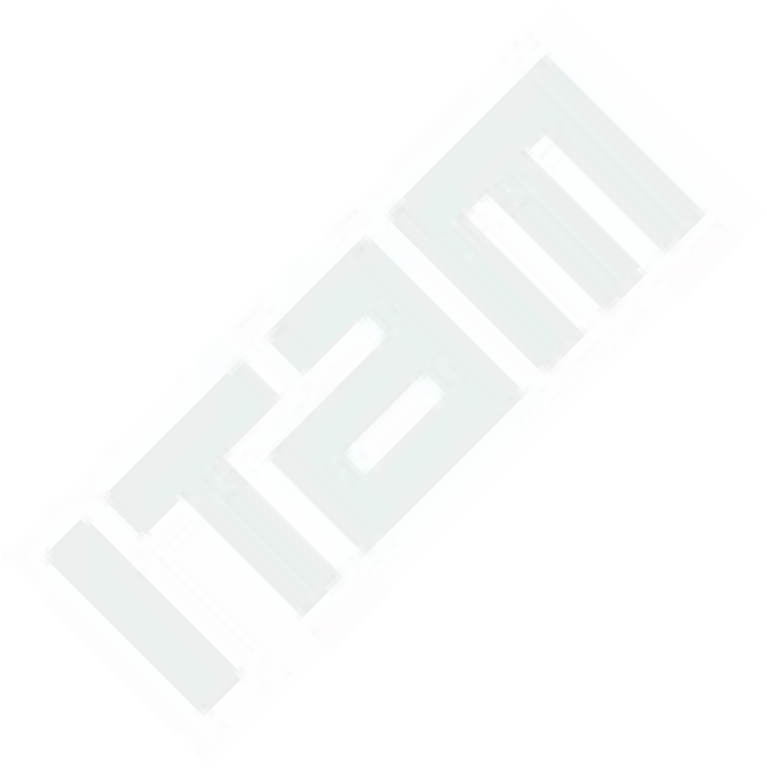
$$E(X_2|X_1 = x_1) = \mu_2 + \rho \frac{\sigma_2}{\sigma_1} (x_1 - \mu_1)$$

$$\text{var}(X_2|X_1 = x_1) = \sigma_2^2(1 - \rho^2)$$

Parte II

Tablas de Probabilidades





4. Distribución Binomial

$$X \sim \text{Binomial}(n, \pi)$$

$$p = P(X \leq x) = \sum_{k=0}^x \binom{n}{k} \pi^k (1 - \pi)^{n-k} = 1 - \alpha$$

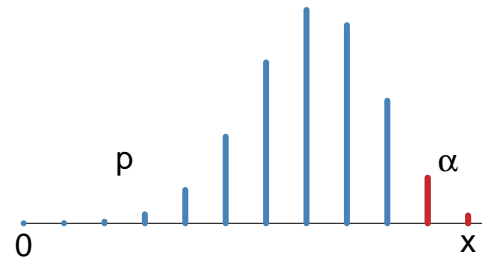


Tabla 4A. Probabilidades acumuladas p de la distribución binomial ($n = 5, 6, 7, 8, 9$).

	x	0.01	0.05	0.1	0.2	0.25	0.3	0.4	π 0.5	0.6	0.7	0.75	0.8	0.9	0.95	0.99
$n = 5$	0	0.951	0.774	0.590	0.328	0.237	0.168	0.078	0.031	0.010	0.002	0.001	0.000	0.000	0.000	0.000
	1	0.999	0.977	0.919	0.737	0.633	0.528	0.337	0.188	0.087	0.031	0.016	0.007	0.000	0.000	0.000
	2	1.000	0.999	0.991	0.942	0.896	0.837	0.683	0.500	0.317	0.163	0.104	0.058	0.009	0.001	0.000
	3	1.000	1.000	1.000	0.993	0.984	0.969	0.913	0.813	0.663	0.472	0.367	0.263	0.081	0.023	0.001
	4	1.000	1.000	1.000	1.000	0.999	0.998	0.990	0.969	0.922	0.832	0.763	0.672	0.410	0.226	0.049
	5	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 6$	0	0.941	0.735	0.531	0.262	0.178	0.118	0.047	0.016	0.004	0.001	0.000	0.000	0.000	0.000	0.000
	1	0.999	0.967	0.886	0.655	0.534	0.420	0.233	0.109	0.041	0.011	0.005	0.002	0.000	0.000	0.000
	2	1.000	0.998	0.984	0.901	0.831	0.744	0.544	0.344	0.179	0.070	0.038	0.017	0.001	0.000	0.000
	3	1.000	1.000	0.999	0.983	0.962	0.930	0.821	0.656	0.456	0.256	0.169	0.099	0.016	0.002	0.000
	4	1.000	1.000	1.000	0.998	0.995	0.989	0.959	0.891	0.767	0.580	0.466	0.345	0.114	0.033	0.001
	5	1.000	1.000	1.000	1.000	1.000	0.999	0.996	0.984	0.953	0.882	0.822	0.738	0.469	0.265	0.059
	6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 7$	0	0.932	0.698	0.478	0.210	0.133	0.082	0.028	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.998	0.956	0.850	0.577	0.445	0.329	0.159	0.063	0.019	0.004	0.001	0.000	0.000	0.000	0.000
	2	1.000	0.996	0.974	0.852	0.756	0.647	0.420	0.227	0.096	0.029	0.013	0.005	0.000	0.000	0.000
	3	1.000	1.000	0.997	0.967	0.929	0.874	0.710	0.500	0.290	0.126	0.071	0.033	0.003	0.000	0.000
	4	1.000	1.000	1.000	0.995	0.987	0.971	0.904	0.773	0.580	0.353	0.244	0.148	0.026	0.004	0.000
	5	1.000	1.000	1.000	1.000	0.999	0.996	0.981	0.938	0.841	0.671	0.555	0.423	0.150	0.044	0.002
	6	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.992	0.972	0.918	0.867	0.790	0.522	0.302	0.068
	7	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 8$	0	0.923	0.663	0.430	0.168	0.100	0.058	0.017	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.997	0.943	0.813	0.503	0.367	0.255	0.106	0.035	0.009	0.001	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.994	0.962	0.797	0.679	0.552	0.315	0.145	0.050	0.011	0.004	0.001	0.000	0.000	0.000
	3	1.000	1.000	0.995	0.944	0.886	0.806	0.594	0.363	0.174	0.058	0.027	0.010	0.000	0.000	0.000
	4	1.000	1.000	1.000	0.990	0.973	0.942	0.826	0.637	0.406	0.194	0.114	0.056	0.005	0.000	0.000
	5	1.000	1.000	1.000	0.999	0.996	0.989	0.950	0.855	0.685	0.448	0.321	0.203	0.038	0.006	0.000
	6	1.000	1.000	1.000	1.000	1.000	0.999	0.991	0.965	0.894	0.745	0.633	0.497	0.187	0.057	0.003
	7	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.996	0.983	0.942	0.900	0.832	0.570	0.337	0.077
	8	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 9$	0	0.914	0.630	0.387	0.134	0.075	0.040	0.010	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.997	0.929	0.775	0.436	0.300	0.196	0.071	0.020	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.992	0.947	0.738	0.601	0.463	0.232	0.090	0.025	0.004	0.001	0.000	0.000	0.000	0.000
	3	1.000	0.999	0.992	0.914	0.834	0.730	0.483	0.254	0.099	0.025	0.010	0.003	0.000	0.000	0.000
	4	1.000	1.000	0.999	0.980	0.951	0.901	0.733	0.500	0.267	0.099	0.049	0.020	0.001	0.000	0.000
	5	1.000	1.000	1.000	0.997	0.990	0.975	0.901	0.746	0.517	0.270	0.166	0.086	0.008	0.001	0.000
	6	1.000	1.000	1.000	1.000	0.999	0.996	0.975	0.910	0.768	0.537	0.399	0.262	0.053	0.008	0.000
	7	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.980	0.929	0.804	0.700	0.564	0.225	0.071	0.003
	8	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.990	0.960	0.925	0.866	0.613	0.370	0.086	0.000
	9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Tabla 4B. Probabilidades acumuladas p de la distribución binomial ($n = 10, 11, 12, 13, 14$).

n	x	π														
		0.01	0.05	0.1	0.2	0.25	0.3	0.4	0.5	0.6	0.7	0.75	0.8	0.9	0.95	0.99
$n = 10$	0	0.904	0.599	0.349	0.107	0.056	0.028	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.996	0.914	0.736	0.376	0.244	0.149	0.046	0.011	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.988	0.930	0.678	0.526	0.383	0.167	0.055	0.012	0.002	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.999	0.987	0.879	0.776	0.650	0.382	0.172	0.055	0.011	0.004	0.001	0.000	0.000	0.000
	4	1.000	1.000	0.998	0.967	0.922	0.850	0.633	0.377	0.166	0.047	0.020	0.006	0.000	0.000	0.000
	5	1.000	1.000	1.000	0.994	0.980	0.953	0.834	0.623	0.367	0.150	0.078	0.033	0.002	0.000	0.000
	6	1.000	1.000	1.000	0.999	0.996	0.989	0.945	0.828	0.618	0.350	0.224	0.121	0.013	0.001	0.000
	7	1.000	1.000	1.000	1.000	1.000	0.998	0.988	0.945	0.833	0.617	0.474	0.322	0.070	0.012	0.000
	8	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.989	0.954	0.851	0.756	0.624	0.264	0.086	0.004
	9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.994	0.972	0.944	0.893	0.651	0.401	0.096
	10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 11$	0	0.895	0.569	0.314	0.086	0.042	0.020	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.995	0.898	0.697	0.322	0.197	0.113	0.030	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.985	0.910	0.617	0.455	0.313	0.119	0.033	0.006	0.001	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.998	0.981	0.839	0.713	0.570	0.296	0.113	0.029	0.004	0.001	0.000	0.000	0.000	0.000
	4	1.000	1.000	0.997	0.950	0.885	0.790	0.533	0.274	0.099	0.022	0.008	0.002	0.000	0.000	0.000
	5	1.000	1.000	1.000	0.988	0.966	0.922	0.753	0.500	0.247	0.078	0.034	0.012	0.000	0.000	0.000
	6	1.000	1.000	1.000	0.998	0.992	0.978	0.901	0.726	0.467	0.210	0.115	0.050	0.003	0.000	0.000
	7	1.000	1.000	1.000	1.000	0.999	0.996	0.971	0.887	0.704	0.430	0.287	0.161	0.019	0.002	0.000
	8	1.000	1.000	1.000	1.000	1.000	0.999	0.994	0.967	0.881	0.687	0.545	0.383	0.090	0.015	0.000
	9	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.994	0.970	0.887	0.803	0.678	0.303	0.102	0.005
	10	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.980	0.958	0.914	0.686	0.431	0.105	0.005
	11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 12$	0	0.886	0.540	0.282	0.069	0.032	0.014	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.994	0.882	0.659	0.275	0.158	0.085	0.020	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.980	0.889	0.558	0.391	0.253	0.083	0.019	0.003	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.998	0.974	0.795	0.649	0.493	0.225	0.073	0.015	0.002	0.000	0.000	0.000	0.000	0.000
	4	1.000	1.000	0.996	0.927	0.842	0.724	0.438	0.194	0.057	0.009	0.003	0.001	0.000	0.000	0.000
	5	1.000	1.000	0.999	0.981	0.946	0.882	0.665	0.387	0.158	0.039	0.014	0.004	0.000	0.000	0.000
	6	1.000	1.000	1.000	0.996	0.986	0.961	0.842	0.613	0.335	0.118	0.054	0.019	0.001	0.000	0.000
	7	1.000	1.000	1.000	0.999	0.997	0.991	0.943	0.806	0.562	0.276	0.158	0.073	0.004	0.000	0.000
	8	1.000	1.000	1.000	1.000	1.000	0.998	0.985	0.927	0.775	0.507	0.351	0.205	0.026	0.002	0.000
	9	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.981	0.917	0.747	0.609	0.442	0.111	0.020	0.000
	10	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.980	0.915	0.842	0.725	0.341	0.118	0.006	0.000
	11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.986	0.968	0.931	0.718	0.460	0.114	0.006
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 13$	0	0.878	0.513	0.254	0.055	0.024	0.010	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.993	0.865	0.621	0.234	0.127	0.064	0.013	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.975	0.866	0.502	0.333	0.202	0.058	0.011	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.997	0.966	0.747	0.584	0.421	0.169	0.046	0.008	0.001	0.000	0.000	0.000	0.000	0.000
	4	1.000	1.000	0.994	0.901	0.794	0.654	0.353	0.133	0.032	0.004	0.001	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.999	0.970	0.920	0.835	0.574	0.291	0.098	0.018	0.006	0.001	0.000	0.000	0.000
	6	1.000	1.000	1.000	0.993	0.976	0.938	0.771	0.500	0.229	0.062	0.024	0.007	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.999	0.994	0.982	0.902	0.709	0.426	0.165	0.080	0.030	0.001	0.000	0.000
	8	1.000	1.000	1.000	1.000	0.999	0.996	0.968	0.867	0.647	0.346	0.206	0.099	0.006	0.000	0.000
	9	1.000	1.000	1.000	1.000	1.000	0.999	0.992	0.954	0.831	0.579	0.416	0.253	0.034	0.003	0.000
	10	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.989	0.942	0.798	0.667	0.498	0.134	0.025	0.000
	11	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.987	0.936	0.873	0.766	0.379	0.135	0.007
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.990	0.976	0.945	0.746	0.487	0.122	0.007
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 14$	0	0.869	0.488	0.229	0.044	0.018	0.007	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.992	0.847	0.585	0.198	0.101	0.047	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.970	0.842	0.448	0.281	0.161	0.040	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.996	0.956	0.698	0.521	0.355	0.124	0.029	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	1.000	0.991	0.870	0.742	0.584	0.279	0.090	0.018	0.002	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.999	0.956	0.888	0.781	0.486	0.212	0.058	0.008	0.002	0.000	0.000	0.000	0.000
	6	1.000	1.000	1.000	0.988	0.962	0.907	0.692	0.395	0.150	0.031	0.010	0.002	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.998	0.990	0.969	0.850	0.605	0.308	0.093	0.038	0.012	0.000	0.000	0.000
	8	1.000	1.000	1.000	1.000	0.998	0.992	0.942	0.788	0.514	0.219	0.112	0.044	0.001	0.000	0.000
	9	1.000	1.000	1.000	1.000	1.000	0.998	0.982	0.910	0.721	0.416	0.258	0.130	0.009	0.000	0.000
	10	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.971	0.876	0.645	0.479	0.302	0.044	0.004	0.000
	11	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.994	0.960	0.839	0.719	0.552	0.158	0.030	0.000
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.992	0.953	0.899	0.802	0.415	0.153	0.008
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.993	0.982	0.956	0.771	0.512	0.131
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Tabla 4C. Probabilidades acumuladas p de la distribución binomial ($n = 15, 16, 17, 18$).

x	π														
	0.01	0.05	0.1	0.2	0.25	0.3	0.4	0.5	0.6	0.7	0.75	0.8	0.9	0.95	0.99
$n = 15$	0	0.860	0.463	0.206	0.035	0.013	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.990	0.829	0.549	0.167	0.080	0.035	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	1.000	0.964	0.816	0.398	0.236	0.127	0.027	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.995	0.944	0.648	0.461	0.297	0.091	0.018	0.002	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.999	0.987	0.836	0.686	0.515	0.217	0.059	0.009	0.001	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.998	0.939	0.852	0.722	0.403	0.151	0.034	0.004	0.001	0.000	0.000	0.000
	6	1.000	1.000	1.000	0.982	0.943	0.869	0.610	0.304	0.095	0.015	0.004	0.001	0.000	0.000
	7	1.000	1.000	1.000	0.996	0.983	0.950	0.787	0.500	0.213	0.050	0.017	0.004	0.000	0.000
	8	1.000	1.000	1.000	0.999	0.996	0.985	0.905	0.696	0.390	0.131	0.057	0.018	0.000	0.000
	9	1.000	1.000	1.000	1.000	0.999	0.996	0.966	0.849	0.597	0.278	0.148	0.061	0.002	0.000
	10	1.000	1.000	1.000	1.000	1.000	0.999	0.991	0.941	0.783	0.485	0.314	0.164	0.013	0.001
	11	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.982	0.909	0.703	0.539	0.352	0.056	0.005
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.973	0.873	0.764	0.602	0.184	0.036
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.965	0.920	0.833	0.451	0.171
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.987	0.965	0.794	0.537
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 16$	0	0.851	0.440	0.185	0.028	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.989	0.811	0.515	0.141	0.063	0.026	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.957	0.789	0.352	0.197	0.099	0.018	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.993	0.932	0.598	0.405	0.246	0.065	0.011	0.001	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.999	0.983	0.798	0.630	0.450	0.167	0.038	0.005	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.997	0.918	0.810	0.660	0.329	0.105	0.019	0.002	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.999	0.973	0.920	0.825	0.527	0.227	0.058	0.007	0.002	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.993	0.973	0.926	0.716	0.402	0.142	0.026	0.007	0.001	0.000	0.000
	8	1.000	1.000	1.000	0.999	0.993	0.974	0.858	0.598	0.284	0.074	0.027	0.007	0.000	0.000
	9	1.000	1.000	1.000	1.000	0.998	0.993	0.942	0.773	0.473	0.175	0.080	0.027	0.001	0.000
	10	1.000	1.000	1.000	1.000	1.000	0.998	0.981	0.895	0.671	0.340	0.190	0.082	0.003	0.000
	11	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.962	0.833	0.550	0.370	0.202	0.017	0.001
	12	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.989	0.935	0.754	0.595	0.402	0.068	0.007
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.982	0.901	0.803	0.648	0.211	0.043
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.974	0.937	0.859	0.485	0.189	0.011
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.990	0.972	0.815	0.560	0.149
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 17$	0	0.843	0.418	0.167	0.023	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.988	0.792	0.482	0.118	0.050	0.019	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.950	0.762	0.310	0.164	0.077	0.012	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.991	0.917	0.549	0.353	0.202	0.046	0.006	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.999	0.978	0.758	0.574	0.389	0.126	0.025	0.003	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.995	0.894	0.765	0.597	0.264	0.072	0.011	0.001	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.999	0.962	0.893	0.775	0.448	0.166	0.035	0.003	0.001	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.989	0.960	0.895	0.641	0.315	0.092	0.013	0.003	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.997	0.988	0.960	0.801	0.500	0.199	0.040	0.012	0.003	0.000	0.000
	9	1.000	1.000	1.000	1.000	0.997	0.987	0.908	0.685	0.359	0.105	0.040	0.011	0.000	0.000
	10	1.000	1.000	1.000	1.000	0.999	0.997	0.965	0.834	0.552	0.225	0.107	0.038	0.001	0.000
	11	1.000	1.000	1.000	1.000	1.000	0.999	0.989	0.928	0.736	0.403	0.235	0.106	0.005	0.000
	12	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.975	0.874	0.611	0.426	0.242	0.022	0.001
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.954	0.798	0.647	0.451	0.083	0.009
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.988	0.923	0.836	0.690	0.238	0.050
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.981	0.950	0.882	0.518	0.208
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.992	0.977	0.833	0.582	0.157
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 18$	0	0.835	0.397	0.150	0.018	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.986	0.774	0.450	0.099	0.039	0.014	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.942	0.734	0.271	0.135	0.060	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.989	0.902	0.501	0.306	0.165	0.033	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.998	0.972	0.716	0.519	0.333	0.094	0.015	0.001	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.994	0.867	0.717	0.534	0.209	0.048	0.006	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.999	0.949	0.861	0.722	0.374	0.119	0.020	0.001	0.000	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.984	0.943	0.859	0.563	0.240	0.058	0.006	0.001	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.996	0.981	0.940	0.737	0.407	0.135	0.021	0.005	0.001	0.000	0.000
	9	1.000	1.000	1.000	0.999	0.995	0.979	0.865	0.593	0.263	0.060	0.019	0.004	0.000	0.000
	10	1.000	1.000	1.000	1.000	0.999	0.994	0.942	0.760	0.437	0.141	0.057	0.016	0.000	0.000
	11	1.000	1.000	1.000	1.000	1.000	0.999	0.980	0.881	0.626	0.278	0.139	0.051	0.001	0.000
	12	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.952	0.791	0.466	0.283	0.133	0.006	0.000
	13	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.985	0.906	0.667	0.481	0.284	0.028	0.002
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.967	0.835	0.694	0.499	0.098	0.011
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.992	0.940	0.865	0.729	0.266	0.058
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.986	0.961	0.901	0.550	0.226
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.994	0.982	0.850	0.603
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Tabla 4D. Probabilidades acumuladas p de la distribución binomial ($n = 19, 20, 21$).

x	π														
	0.01	0.05	0.1	0.2	0.25	0.3	0.4	0.5	0.6	0.7	0.75	0.8	0.9	0.95	0.99
$n = 19$	0	0.826	0.377	0.135	0.014	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.985	0.755	0.420	0.083	0.031	0.010	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.933	0.705	0.237	0.111	0.046	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.987	0.885	0.455	0.263	0.133	0.023	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.998	0.965	0.673	0.465	0.282	0.070	0.010	0.001	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.991	0.837	0.668	0.474	0.163	0.032	0.003	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.998	0.932	0.825	0.666	0.308	0.084	0.012	0.001	0.000	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.977	0.923	0.818	0.488	0.180	0.035	0.003	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.993	0.971	0.916	0.667	0.324	0.088	0.011	0.002	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.998	0.991	0.967	0.814	0.500	0.186	0.033	0.009	0.002	0.000	0.000
	10	1.000	1.000	1.000	1.000	0.998	0.989	0.912	0.676	0.333	0.084	0.029	0.007	0.000	0.000
	11	1.000	1.000	1.000	1.000	1.000	0.997	0.965	0.820	0.512	0.182	0.077	0.023	0.000	0.000
	12	1.000	1.000	1.000	1.000	1.000	0.999	0.988	0.916	0.692	0.334	0.175	0.068	0.002	0.000
	13	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.968	0.837	0.526	0.332	0.163	0.009	0.000
	14	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.990	0.930	0.718	0.535	0.327	0.035	0.002
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.977	0.867	0.737	0.545	0.115	0.013
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.954	0.889	0.763	0.295	0.067
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.990	0.969	0.917	0.580	0.245
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.996	0.986	0.865	0.623
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 20$	0	0.818	0.358	0.122	0.012	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.983	0.736	0.392	0.069	0.024	0.008	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.925	0.677	0.206	0.091	0.035	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.984	0.867	0.411	0.225	0.107	0.016	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.997	0.957	0.630	0.415	0.238	0.051	0.006	0.000	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.989	0.804	0.617	0.416	0.126	0.021	0.002	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.998	0.913	0.786	0.608	0.250	0.058	0.006	0.000	0.000	0.000	0.000	0.000
	7	1.000	1.000	1.000	0.968	0.898	0.772	0.416	0.132	0.021	0.001	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.990	0.959	0.887	0.596	0.252	0.057	0.005	0.001	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.997	0.986	0.952	0.755	0.412	0.128	0.017	0.004	0.001	0.000	0.000
	10	1.000	1.000	1.000	0.999	0.996	0.983	0.872	0.588	0.245	0.048	0.014	0.003	0.000	0.000
	11	1.000	1.000	1.000	1.000	0.999	0.995	0.943	0.748	0.404	0.113	0.041	0.010	0.000	0.000
	12	1.000	1.000	1.000	1.000	1.000	0.999	0.979	0.868	0.584	0.228	0.102	0.032	0.000	0.000
	13	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.942	0.750	0.392	0.214	0.087	0.002	0.000
	14	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.979	0.874	0.584	0.383	0.196	0.011	0.000
	15	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.949	0.762	0.585	0.370	0.043	0.003
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.984	0.893	0.775	0.589	0.133	0.016
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.965	0.909	0.794	0.323	0.075
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.992	0.976	0.931	0.608	0.264
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.997	0.988	0.878	0.642
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 21$	0	0.810	0.341	0.109	0.009	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.981	0.717	0.365	0.058	0.019	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.915	0.648	0.179	0.075	0.027	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.981	0.848	0.370	0.192	0.086	0.011	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.997	0.948	0.586	0.367	0.198	0.037	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	5	1.000	1.000	0.986	0.769	0.567	0.363	0.096	0.013	0.001	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.997	0.891	0.744	0.551	0.200	0.039	0.004	0.000	0.000	0.000	0.000	0.000
	7	1.000	1.000	0.999	0.957	0.870	0.723	0.350	0.095	0.012	0.001	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.986	0.944	0.852	0.524	0.192	0.035	0.002	0.000	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.996	0.979	0.932	0.691	0.332	0.085	0.009	0.002	0.000	0.000	0.000
	10	1.000	1.000	1.000	0.999	0.994	0.974	0.826	0.500	0.174	0.026	0.006	0.001	0.000	0.000
	11	1.000	1.000	1.000	1.000	0.998	0.991	0.915	0.668	0.309	0.068	0.021	0.004	0.000	0.000
	12	1.000	1.000	1.000	1.000	1.000	0.998	0.965	0.808	0.476	0.148	0.056	0.014	0.000	0.000
	13	1.000	1.000	1.000	1.000	1.000	0.999	0.988	0.905	0.650	0.277	0.130	0.043	0.001	0.000
	14	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.961	0.800	0.449	0.256	0.109	0.003	0.000
	15	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.987	0.904	0.637	0.433	0.231	0.014	0.000
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.963	0.802	0.633	0.414	0.052	0.003
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.989	0.914	0.808	0.630	0.152	0.019
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.973	0.925	0.821	0.352	0.085
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.981	0.942	0.635	0.283
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.998	0.991	0.891	0.659
	21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Tabla 4E. Probabilidades acumuladas p de la distribución binomial ($n = 22, 23$).

		π														
	x	0.01	0.05	0.1	0.2	0.25	0.3	0.4	0.5	0.6	0.7	0.75	0.8	0.9	0.95	0.99
$n = 22$	0	0.802	0.324	0.098	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.980	0.698	0.339	0.048	0.015	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.999	0.905	0.620	0.154	0.061	0.021	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.978	0.828	0.332	0.162	0.068	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.996	0.938	0.543	0.323	0.165	0.027	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	1.000	0.999	0.982	0.733	0.517	0.313	0.072	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.996	0.867	0.699	0.494	0.158	0.026	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	7	1.000	1.000	0.999	0.944	0.838	0.671	0.290	0.067	0.007	0.000	0.000	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.980	0.925	0.814	0.454	0.143	0.021	0.001	0.000	0.000	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.994	0.970	0.908	0.624	0.262	0.055	0.004	0.001	0.000	0.000	0.000	0.000
	10	1.000	1.000	1.000	0.998	0.990	0.961	0.772	0.416	0.121	0.014	0.003	0.000	0.000	0.000	0.000
	11	1.000	1.000	1.000	1.000	0.997	0.986	0.879	0.584	0.228	0.039	0.010	0.002	0.000	0.000	0.000
	12	1.000	1.000	1.000	1.000	0.999	0.996	0.945	0.738	0.376	0.092	0.030	0.006	0.000	0.000	0.000
	13	1.000	1.000	1.000	1.000	1.000	0.999	0.979	0.857	0.546	0.186	0.075	0.020	0.000	0.000	0.000
	14	1.000	1.000	1.000	1.000	1.000	1.000	0.993	0.933	0.710	0.329	0.162	0.056	0.001	0.000	0.000
	15	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.974	0.842	0.506	0.301	0.133	0.004	0.000	0.000
	16	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.992	0.928	0.687	0.483	0.267	0.018	0.001	0.000
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.973	0.835	0.677	0.457	0.062	0.004	0.000
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.992	0.932	0.838	0.668	0.172	0.022	0.000
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.979	0.939	0.846	0.380	0.095	0.001
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.985	0.952	0.661	0.302	0.020
	21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.993	0.902	0.676	0.198
22	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
$n = 23$	0	0.794	0.307	0.089	0.006	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.978	0.679	0.315	0.040	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.998	0.895	0.592	0.133	0.049	0.016	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.974	0.807	0.297	0.137	0.054	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.995	0.927	0.501	0.283	0.136	0.019	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	1.000	0.999	0.977	0.695	0.468	0.269	0.054	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.994	0.840	0.654	0.440	0.124	0.017	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	7	1.000	1.000	0.999	0.928	0.804	0.618	0.237	0.047	0.004	0.000	0.000	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.973	0.904	0.771	0.388	0.105	0.013	0.001	0.000	0.000	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.991	0.959	0.880	0.556	0.202	0.035	0.002	0.000	0.000	0.000	0.000	0.000
	10	1.000	1.000	1.000	0.997	0.985	0.945	0.713	0.339	0.081	0.007	0.001	0.000	0.000	0.000	0.000
	11	1.000	1.000	1.000	0.999	0.995	0.979	0.836	0.500	0.164	0.021	0.005	0.001	0.000	0.000	0.000
	12	1.000	1.000	1.000	1.000	0.999	0.993	0.919	0.661	0.287	0.055	0.015	0.003	0.000	0.000	0.000
	13	1.000	1.000	1.000	1.000	1.000	0.998	0.965	0.798	0.444	0.120	0.041	0.009	0.000	0.000	0.000
	14	1.000	1.000	1.000	1.000	1.000	0.999	0.987	0.895	0.612	0.229	0.096	0.027	0.000	0.000	0.000
	15	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.953	0.763	0.382	0.196	0.072	0.001	0.000	0.000
	16	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.983	0.876	0.560	0.346	0.160	0.006	0.000	0.000
	17	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.946	0.731	0.532	0.305	0.023	0.001	0.000
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.981	0.864	0.717	0.499	0.073	0.005	0.000
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995	0.946	0.863	0.703	0.193	0.026	0.000
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.984	0.951	0.867	0.408	0.105	0.002
	21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.988	0.960	0.685	0.321	0.022
	22	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.994	0.911	0.693	0.206
23	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	

Tabla 4F. Probabilidades acumuladas p de la distribución binomial ($n = 24, 25$).

x	π														
	0.01	0.05	0.1	0.2	0.25	0.3	0.4	0.5	0.6	0.7	0.75	0.8	0.9	0.95	0.99
$n = 24$	0	0.786	0.292	0.080	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.976	0.661	0.292	0.033	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.998	0.884	0.564	0.115	0.040	0.012	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.970	0.786	0.264	0.115	0.042	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.994	0.915	0.460	0.247	0.111	0.013	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	5	1.000	0.999	0.972	0.656	0.422	0.229	0.040	0.003	0.000	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.993	0.811	0.607	0.389	0.096	0.011	0.001	0.000	0.000	0.000	0.000	0.000
	7	1.000	1.000	0.998	0.911	0.766	0.565	0.192	0.032	0.002	0.000	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.964	0.879	0.725	0.328	0.076	0.008	0.000	0.000	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.987	0.945	0.847	0.489	0.154	0.022	0.001	0.000	0.000	0.000	0.000
	10	1.000	1.000	1.000	0.996	0.979	0.926	0.650	0.271	0.053	0.004	0.001	0.000	0.000	0.000
	11	1.000	1.000	1.000	0.999	0.993	0.969	0.787	0.419	0.114	0.012	0.002	0.000	0.000	0.000
	12	1.000	1.000	1.000	1.000	0.998	0.988	0.886	0.581	0.213	0.031	0.007	0.001	0.000	0.000
	13	1.000	1.000	1.000	1.000	0.999	0.996	0.947	0.729	0.350	0.074	0.021	0.004	0.000	0.000
	14	1.000	1.000	1.000	1.000	1.000	0.999	0.978	0.846	0.511	0.153	0.055	0.013	0.000	0.000
	15	1.000	1.000	1.000	1.000	1.000	1.000	0.992	0.924	0.672	0.275	0.121	0.036	0.000	0.000
	16	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.968	0.808	0.435	0.234	0.089	0.002	0.000
	17	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.989	0.904	0.611	0.393	0.189	0.007	0.000
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.960	0.771	0.578	0.344	0.028	0.001
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.987	0.889	0.753	0.540	0.085	0.006
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.958	0.885	0.736	0.214	0.030	0.000
	21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.988	0.960	0.885	0.436	0.116	0.002
	22	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.991	0.967	0.708	0.339	0.024
	23	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.995	0.920	0.708	0.214
	24	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$n = 25$	0	0.778	0.277	0.072	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1	0.974	0.642	0.271	0.027	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.998	0.873	0.537	0.098	0.032	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	1.000	0.966	0.764	0.234	0.096	0.033	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4	1.000	0.993	0.902	0.421	0.214	0.090	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5	1.000	0.999	0.967	0.617	0.378	0.193	0.029	0.002	0.000	0.000	0.000	0.000	0.000	0.000
	6	1.000	1.000	0.991	0.780	0.561	0.341	0.074	0.007	0.000	0.000	0.000	0.000	0.000	0.000
	7	1.000	1.000	0.998	0.891	0.727	0.512	0.154	0.022	0.001	0.000	0.000	0.000	0.000	0.000
	8	1.000	1.000	1.000	0.953	0.851	0.677	0.274	0.054	0.004	0.000	0.000	0.000	0.000	0.000
	9	1.000	1.000	1.000	0.983	0.929	0.811	0.425	0.115	0.013	0.000	0.000	0.000	0.000	0.000
	10	1.000	1.000	1.000	0.994	0.970	0.902	0.586	0.212	0.034	0.002	0.000	0.000	0.000	0.000
	11	1.000	1.000	1.000	0.998	0.989	0.956	0.732	0.345	0.078	0.006	0.001	0.000	0.000	0.000
	12	1.000	1.000	1.000	1.000	0.997	0.983	0.846	0.500	0.154	0.017	0.003	0.000	0.000	0.000
	13	1.000	1.000	1.000	1.000	0.999	0.994	0.922	0.655	0.268	0.044	0.011	0.002	0.000	0.000
	14	1.000	1.000	1.000	1.000	1.000	0.998	0.966	0.788	0.414	0.098	0.030	0.006	0.000	0.000
	15	1.000	1.000	1.000	1.000	1.000	1.000	0.987	0.885	0.575	0.189	0.071	0.017	0.000	0.000
	16	1.000	1.000	1.000	1.000	1.000	1.000	0.996	0.946	0.726	0.323	0.149	0.047	0.000	0.000
	17	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.978	0.846	0.488	0.273	0.109	0.002	0.000
	18	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.993	0.926	0.659	0.439	0.220	0.009	0.000
	19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.971	0.807	0.622	0.383	0.033	0.001
	20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.910	0.786	0.579	0.098	0.007	0.000
	21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.967	0.904	0.766	0.236	0.034	0.000
	22	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.968	0.902	0.463	0.127	0.002
	23	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.993	0.973	0.729	0.358	0.026
	24	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.996	0.928	0.723	0.222
	24	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

5. Distribución Poisson

$$X \sim \text{Poisson}(\lambda)$$

$$p = P(X \leq x) = \sum_{k=0}^x \frac{\lambda^k e^{-\lambda}}{k!} = 1 - \alpha$$

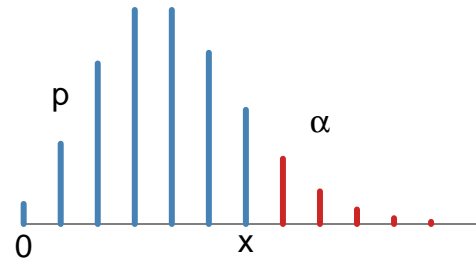
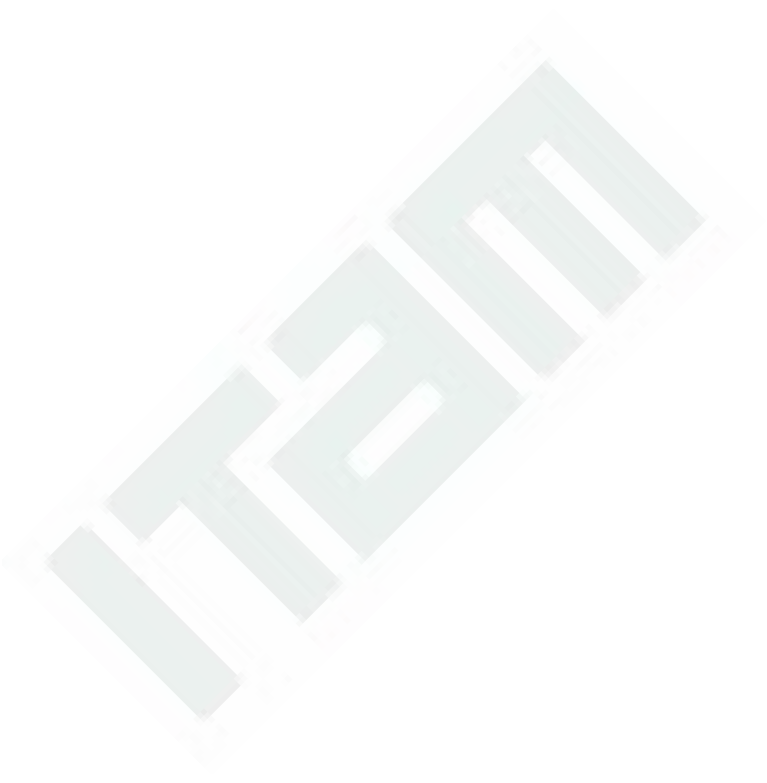


Tabla 5A. Probabilidades acumuladas p de la distribución Poisson.

x	λ									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0	0.905	0.819	0.741	0.670	0.607	0.549	0.497	0.449	0.407	0.368
1	0.995	0.982	0.963	0.938	0.910	0.878	0.844	0.809	0.772	0.736
2	1.000	0.999	0.996	0.992	0.986	0.977	0.966	0.953	0.937	0.920
3	1.000	1.000	1.000	0.999	0.998	0.997	0.994	0.991	0.987	0.981
4	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.999	0.998	0.996
5	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
6	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Tabla 5B. Probabilidades acumuladas p de la distribución Poisson.

x	λ										
	2	3	4	5	6	7	8	9	10	15	20
0	0.135	0.050	0.018	0.007	0.002	0.001	0.000	0.000	0.000	0.000	0.000
1	0.406	0.199	0.092	0.040	0.017	0.007	0.003	0.001	0.000	0.000	0.000
2	0.677	0.423	0.238	0.125	0.062	0.030	0.014	0.006	0.003	0.000	0.000
3	0.857	0.647	0.433	0.265	0.151	0.082	0.042	0.021	0.010	0.000	0.000
4	0.947	0.815	0.629	0.440	0.285	0.173	0.100	0.055	0.029	0.001	0.000
5	0.983	0.916	0.785	0.616	0.446	0.301	0.191	0.116	0.067	0.003	0.000
6	0.995	0.966	0.889	0.762	0.606	0.450	0.313	0.207	0.130	0.008	0.000
7	0.999	0.988	0.949	0.867	0.744	0.599	0.453	0.324	0.220	0.018	0.001
8	1.000	0.996	0.979	0.932	0.847	0.729	0.593	0.456	0.333	0.037	0.002
9	1.000	0.999	0.992	0.968	0.916	0.830	0.717	0.587	0.458	0.070	0.005
10	1.000	1.000	0.997	0.986	0.957	0.901	0.816	0.706	0.583	0.118	0.011
11	1.000	1.000	0.999	0.995	0.980	0.947	0.888	0.803	0.697	0.185	0.021
12	1.000	1.000	1.000	0.998	0.991	0.973	0.936	0.876	0.792	0.268	0.039
13	1.000	1.000	1.000	0.999	0.996	0.987	0.966	0.926	0.864	0.363	0.066
14	1.000	1.000	1.000	1.000	0.999	0.994	0.983	0.959	0.917	0.466	0.105
15	1.000	1.000	1.000	1.000	0.999	0.998	0.992	0.978	0.951	0.568	0.157
16	1.000	1.000	1.000	1.000	1.000	0.999	0.996	0.989	0.973	0.664	0.221
17	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.995	0.986	0.749	0.297
18	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.998	0.993	0.819	0.381
19	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.997	0.875	0.470
20	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.917	0.559
21	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.947	0.644
22	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.967	0.721
23	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.981	0.787
24	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.989	0.843
25	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.994	0.888
26	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	0.922
27	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.998	0.948
28	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.966
29	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.978
30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.987
31	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.992
32	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.995
33	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
35	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.999
36	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000



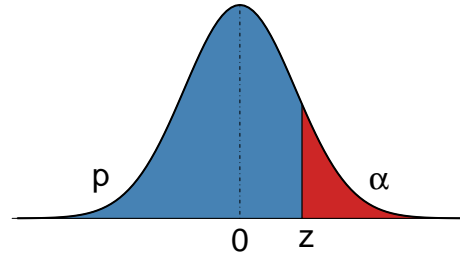
6. Distribución Normal Estándar

$$Z \sim \text{Normal}(0, 1)$$

$$p = P(Z \leq z) = \Phi(z) = \int_{-\infty}^z \phi(u) du = 1 - \alpha$$

donde

$$\phi(u) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}u^2}$$



Nota: Si $X \sim N(\mu, \sigma^2)$, entonces $Z = (X - \mu)/\sigma \sim N(0, 1)$. Luego,

$$P(X \leq x) = \Phi\left(\frac{x - \mu}{\sigma}\right)$$

Tabla 6A. Probabilidades acumuladas p de la distribución normal estándar.

z	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00
-3.4	0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
-3.3	0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005
-3.2	0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007
-3.1	0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0010
-3.0	0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013
-2.9	0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019
-2.8	0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026
-2.7	0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035
-2.6	0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047
-2.5	0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062
-2.4	0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082
-2.3	0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107
-2.2	0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139
-2.1	0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179
-2.0	0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228
-1.9	0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287
-1.8	0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359
-1.7	0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446
-1.6	0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548
-1.5	0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668
-1.4	0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808
-1.3	0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968
-1.2	0.0985	0.1003	0.1020	0.1038	0.1056	0.1075	0.1093	0.1112	0.1131	0.1151
-1.1	0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357
-1.0	0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587
-0.9	0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841
-0.8	0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119
-0.7	0.2148	0.2177	0.2206	0.2236	0.2266	0.2296	0.2327	0.2358	0.2389	0.2420
-0.6	0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743
-0.5	0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085
-0.4	0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446
-0.3	0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821
-0.2	0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207
-0.1	0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602
-0.0	0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000

Tabla 6B. Probabilidades acumuladas p de la distribución normal estándar.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

7. Distribución χ^2 Ji-Cuadrada

$$Y \sim \chi_n^2$$

siendo n los grados de libertad.

$$p = P(Y \leq y) = \int_0^y f_Y(u) du = 1 - \alpha$$

donde, para $u \geq 0$,

$$f_Y(u) = \frac{1}{2^{n/2}\Gamma(n/2)} u^{n/2-1} e^{-u/2}$$

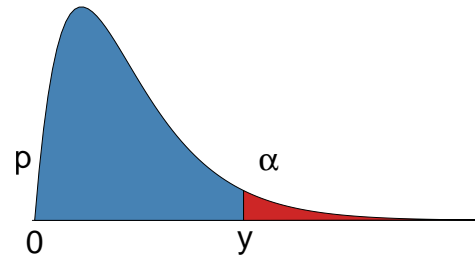
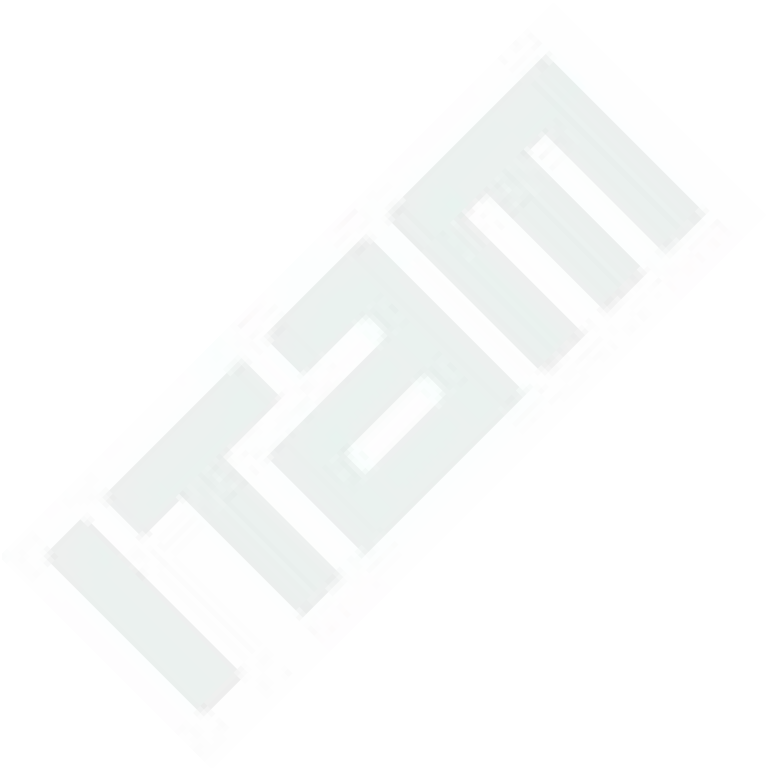


Tabla 7. Valores críticos $\chi_{(\alpha;n)}^2$ de la distribución χ_n^2 Ji-Cuadrada.

	p									
	0.005	0.01	0.025	0.05	0.1	0.90	0.95	0.975	0.99	0.995
n	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
31	14.458	15.655	17.539	19.281	21.434	41.422	44.985	48.232	52.191	55.003
32	15.134	16.362	18.291	20.072	22.271	42.585	46.194	49.480	53.486	56.328
33	15.815	17.074	19.047	20.867	23.110	43.745	47.400	50.725	54.776	57.648
34	16.501	17.789	19.806	21.664	23.952	44.903	48.602	51.966	56.061	58.964
35	17.192	18.509	20.569	22.465	24.797	46.059	49.802	53.203	57.342	60.275
36	17.887	19.233	21.336	23.269	25.643	47.212	50.998	54.437	58.619	61.581
37	18.586	19.960	22.106	24.075	26.492	48.363	52.192	55.668	59.893	62.883
38	19.289	20.691	22.878	24.884	27.343	49.513	53.384	56.896	61.162	64.181
39	19.996	21.426	23.654	25.695	28.196	50.660	54.572	58.120	62.428	65.476
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
75	47.206	49.475	52.942	56.054	59.795	91.061	96.217	100.839	106.393	110.286
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169



8. Distribución t de Student

$$T \sim t_n$$

siendo n los grados de libertad.

$$p = P(T \leq t) = \int_{-\infty}^t f_T(u) du = 1 - \alpha$$

donde, para $-\infty < u < \infty$,

$$f_T(u) = \frac{1}{\sqrt{n\pi}} \frac{\Gamma\left(\frac{n+1}{2}\right)}{\Gamma\left(\frac{n}{2}\right)} \left(1 + \frac{u^2}{n}\right)^{-\frac{n+1}{2}}$$

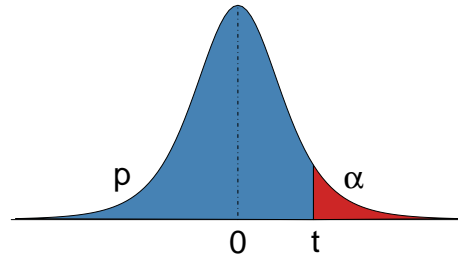


Tabla 8. Valores críticos $t_{(\alpha;n)}$ de la distribución t de Student.

n	p									
	0.75	0.80	0.90	0.95	0.975	0.99	0.995	0.999	0.9995	0.9999
	α	α	α	α	α	α	α	α	α	α
	0.25	0.20	0.10	0.05	0.025	0.01	0.005	0.001	0.0005	0.0001
1	1.000	1.376	3.078	6.314	12.706	31.821	63.657	318.309	636.619	3183.099
2	0.816	1.061	1.886	2.920	4.303	6.965	9.925	22.327	31.599	70.700
3	0.765	0.978	1.638	2.353	3.182	4.541	5.841	10.215	12.924	22.204
4	0.741	0.941	1.533	2.132	2.776	3.747	4.604	7.173	8.610	13.034
5	0.727	0.920	1.476	2.015	2.571	3.365	4.032	5.893	6.869	9.678
6	0.718	0.906	1.440	1.943	2.447	3.143	3.707	5.208	5.959	8.025
7	0.711	0.896	1.415	1.895	2.365	2.998	3.499	4.785	5.408	7.063
8	0.706	0.889	1.397	1.860	2.306	2.896	3.355	4.501	5.041	6.442
9	0.703	0.883	1.383	1.833	2.262	2.821	3.250	4.297	4.781	6.010
10	0.700	0.879	1.372	1.812	2.228	2.764	3.169	4.144	4.587	5.694
11	0.697	0.876	1.363	1.796	2.201	2.718	3.106	4.025	4.437	5.453
12	0.695	0.873	1.356	1.782	2.179	2.681	3.055	3.930	4.318	5.263
13	0.694	0.870	1.350	1.771	2.160	2.650	3.012	3.852	4.221	5.111
14	0.692	0.868	1.345	1.761	2.145	2.624	2.977	3.787	4.140	4.985
15	0.691	0.866	1.341	1.753	2.131	2.602	2.947	3.733	4.073	4.880
16	0.690	0.865	1.337	1.746	2.120	2.583	2.921	3.686	4.015	4.791
17	0.689	0.863	1.333	1.740	2.110	2.567	2.898	3.646	3.965	4.714
18	0.688	0.862	1.330	1.734	2.101	2.552	2.878	3.610	3.922	4.648
19	0.688	0.861	1.328	1.729	2.093	2.539	2.861	3.579	3.883	4.590
20	0.687	0.860	1.325	1.725	2.086	2.528	2.845	3.552	3.850	4.539
21	0.686	0.859	1.323	1.721	2.080	2.518	2.831	3.527	3.819	4.493
22	0.686	0.858	1.321	1.717	2.074	2.508	2.819	3.505	3.792	4.452
23	0.685	0.858	1.319	1.714	2.069	2.500	2.807	3.485	3.768	4.415
24	0.685	0.857	1.318	1.711	2.064	2.492	2.797	3.467	3.745	4.382
25	0.684	0.856	1.316	1.708	2.060	2.485	2.787	3.450	3.725	4.352
26	0.684	0.856	1.315	1.706	2.056	2.479	2.779	3.435	3.707	4.324
27	0.684	0.855	1.314	1.703	2.052	2.473	2.771	3.421	3.690	4.299
28	0.683	0.855	1.313	1.701	2.048	2.467	2.763	3.408	3.674	4.275
29	0.683	0.854	1.311	1.699	2.045	2.462	2.756	3.396	3.659	4.254
30	0.683	0.854	1.310	1.697	2.042	2.457	2.750	3.385	3.646	4.234
40	0.681	0.851	1.303	1.684	2.021	2.423	2.704	3.307	3.551	4.094
50	0.679	0.849	1.299	1.676	2.009	2.403	2.678	3.261	3.496	4.014
75	0.678	0.846	1.293	1.665	1.992	2.377	2.643	3.202	3.425	3.911
100	0.677	0.845	1.290	1.660	1.984	2.364	2.626	3.174	3.390	3.862
125	0.676	0.845	1.288	1.657	1.979	2.357	2.616	3.157	3.370	3.832
∞	0.674	0.842	1.282	1.645	1.960	2.326	2.576	3.090	3.291	3.719



9. Distribución F

$$X \sim F_{n_1, n_2}$$

con n_1 y n_2 los grados de libertad (del numerador y denominador, respectivamente).

$$p = P(X \leq x) = \int_0^x f_X(u) du = 1 - \alpha$$

donde, para $u > 0$,

$$f_X(u) = \frac{\Gamma((n_1 + n_2)/2)}{\Gamma(n_1/2)\Gamma(n_2/2)} \left(\frac{n_1}{n_2}\right)^{n_1/2} \frac{u^{n_1/2-1}}{[1 + (n_1/n_2)u]^{(n_1+n_2)/2}}$$

Nota: Si $X \sim F_{n_1, n_2}$, entonces,

$$p = P(X \leq F_{(1-\alpha; n_1, n_2)}) = P\left(X \leq \frac{1}{F_{(\alpha; n_2, n_1)}}\right) = 1 - \alpha$$

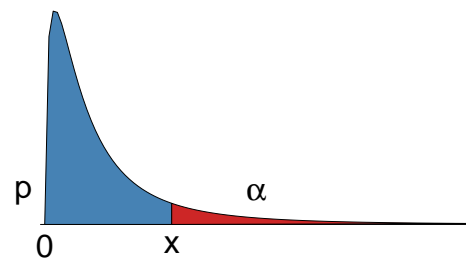


Tabla 9A. Valores críticos $F_{(\alpha;n_1,n_2)}$ de la distribución F .

n_2	$p = 0.90$																		$\alpha = 0.10$
	n_1																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	50	75	100	∞	
1	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86	60.19	60.71	61.22	61.74	62.05	62.69	62.90	63.01	63.32	
2	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38	9.39	9.41	9.42	9.44	9.45	9.47	9.48	9.48	9.49	
3	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24	5.23	5.22	5.20	5.18	5.17	5.15	5.15	5.14	5.13	
4	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94	3.92	3.90	3.87	3.84	3.83	3.80	3.78	3.78	3.76	
5	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32	3.30	3.27	3.24	3.21	3.19	3.15	3.13	3.13	3.11	
6	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96	2.94	2.90	2.87	2.84	2.81	2.77	2.75	2.75	2.72	
7	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72	2.70	2.67	2.63	2.59	2.57	2.52	2.51	2.50	2.47	
8	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56	2.54	2.50	2.46	2.42	2.40	2.35	2.33	2.32	2.29	
9	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44	2.42	2.38	2.34	2.30	2.27	2.22	2.20	2.19	2.16	
10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35	2.32	2.28	2.24	2.20	2.17	2.12	2.10	2.09	2.06	
11	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27	2.25	2.21	2.17	2.12	2.10	2.04	2.02	2.01	1.97	
12	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21	2.19	2.15	2.10	2.06	2.03	1.97	1.95	1.94	1.90	
13	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16	2.14	2.10	2.05	2.01	1.98	1.92	1.89	1.88	1.85	
14	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12	2.10	2.05	2.01	1.96	1.93	1.87	1.85	1.83	1.80	
15	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09	2.06	2.02	1.97	1.92	1.89	1.83	1.80	1.79	1.76	
16	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06	2.03	1.99	1.94	1.89	1.86	1.79	1.77	1.76	1.72	
17	3.03	2.64	2.44	2.31	2.22	2.15	2.10	2.06	2.03	2.00	1.96	1.91	1.86	1.83	1.76	1.74	1.73	1.69	
18	3.01	2.62	2.42	2.29	2.20	2.13	2.08	2.04	2.00	1.98	1.93	1.89	1.84	1.80	1.74	1.71	1.70	1.66	
19	2.99	2.61	2.40	2.27	2.18	2.11	2.06	2.02	1.98	1.96	1.91	1.86	1.81	1.78	1.71	1.69	1.67	1.63	
20	2.97	2.59	2.38	2.25	2.16	2.09	2.04	2.00	1.96	1.94	1.89	1.84	1.79	1.76	1.69	1.66	1.65	1.61	
21	2.96	2.57	2.36	2.23	2.14	2.08	2.02	1.98	1.95	1.92	1.87	1.83	1.78	1.74	1.67	1.64	1.63	1.59	
22	2.95	2.56	2.35	2.22	2.13	2.06	2.01	1.97	1.93	1.90	1.86	1.81	1.76	1.73	1.65	1.63	1.61	1.57	
23	2.94	2.55	2.34	2.21	2.11	2.05	1.99	1.95	1.92	1.89	1.84	1.80	1.74	1.71	1.64	1.61	1.59	1.55	
24	2.93	2.54	2.33	2.19	2.10	2.04	1.98	1.94	1.91	1.88	1.83	1.78	1.73	1.70	1.62	1.59	1.58	1.53	
25	2.92	2.53	2.32	2.18	2.09	2.02	1.97	1.93	1.89	1.87	1.82	1.77	1.72	1.68	1.61	1.58	1.56	1.52	
26	2.91	2.52	2.31	2.17	2.08	2.01	1.96	1.92	1.88	1.86	1.81	1.76	1.71	1.67	1.59	1.57	1.55	1.50	
27	2.90	2.51	2.30	2.17	2.07	2.00	1.95	1.91	1.87	1.85	1.80	1.75	1.70	1.66	1.58	1.55	1.54	1.49	
28	2.89	2.50	2.29	2.16	2.06	2.00	1.94	1.90	1.87	1.84	1.79	1.74	1.69	1.65	1.57	1.54	1.53	1.48	
29	2.89	2.50	2.28	2.15	2.06	1.99	1.93	1.89	1.86	1.83	1.78	1.73	1.68	1.64	1.56	1.53	1.52	1.47	
30	2.88	2.49	2.28	2.14	2.05	1.98	1.93	1.88	1.85	1.82	1.77	1.72	1.67	1.63	1.55	1.52	1.51	1.46	
40	2.84	2.44	2.23	2.09	2.00	1.93	1.87	1.83	1.79	1.76	1.71	1.66	1.61	1.57	1.48	1.45	1.43	1.38	
60	2.79	2.39	2.18	2.04	1.95	1.87	1.82	1.77	1.74	1.71	1.66	1.60	1.54	1.50	1.41	1.38	1.36	1.29	
80	2.77	2.37	2.15	2.02	1.92	1.85	1.79	1.75	1.71	1.68	1.63	1.57	1.51	1.47	1.38	1.34	1.32	1.25	
100	2.76	2.36	2.14	2.00	1.91	1.83	1.78	1.73	1.69	1.66	1.61	1.56	1.49	1.45	1.35	1.32	1.29	1.22	
120	2.75	2.35	2.13	1.99	1.90	1.82	1.77	1.72	1.68	1.65	1.60	1.55	1.48	1.44	1.34	1.30	1.28	1.19	
∞	2.71	2.30	2.08	1.95	1.85	1.77	1.72	1.67	1.63	1.60	1.55	1.49	1.42	1.38	1.26	1.22	1.19	1.03	

Tabla 9B. Valores críticos $F_{(\alpha;n_1,n_2)}$ de la distribución F .

n_2	$p = 0.95$																$\alpha = 0.05$	
	n_1																	
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	50	75	100	∞
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	249.26	251.77	252.62	253.04	254.30
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.46	19.48	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.63	8.58	8.56	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.70	5.68	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.52	4.44	4.42	4.41	4.37
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.83	3.75	3.73	3.71	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.40	3.32	3.29	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.11	3.02	2.99	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.89	2.80	2.77	2.76	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.73	2.64	2.60	2.59	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.60	2.51	2.47	2.46	2.41
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.50	2.40	2.37	2.35	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.41	2.31	2.28	2.26	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.34	2.24	2.21	2.19	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.28	2.18	2.14	2.12	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.23	2.12	2.09	2.07	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.18	2.08	2.04	2.02	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.14	2.04	2.00	1.98	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.00	1.96	1.94	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.07	1.97	1.93	1.91	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	1.94	1.90	1.88	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.02	1.91	1.87	1.85	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.00	1.88	1.84	1.82	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.97	1.86	1.82	1.80	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.84	1.80	1.78	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.94	1.82	1.78	1.76	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.92	1.81	1.76	1.74	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.79	1.75	1.73	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.89	1.77	1.73	1.71	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.88	1.76	1.72	1.70	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.78	1.66	1.61	1.59	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.69	1.56	1.51	1.48	1.39
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.79	1.70	1.64	1.51	1.45	1.43	1.33
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.77	1.68	1.62	1.48	1.42	1.39	1.28
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.60	1.46	1.40	1.37	1.26
∞	3.84	3.00	2.61	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.51	1.35	1.28	1.25	1.03

Tabla 9C. Valores críticos $F_{(\alpha;n_1,n_2)}$ de la distribución F .

n_2	$p = 0.975$																		$\alpha = 0.025$
	n_1																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	50	75	100	∞	
1	648.	799.	864.	900.	922.	937.	948.	957.	963.	969.	977.	985.	993.	998.	1008.	1011.	1013.	1018.	
2	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39	39.40	39.41	39.43	39.45	39.46	39.48	39.48	39.49	39.50	
3	17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47	14.42	14.34	14.25	14.17	14.12	14.01	13.97	13.96	13.90	
4	12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90	8.84	8.75	8.66	8.56	8.50	8.38	8.34	8.32	8.26	
5	10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68	6.62	6.52	6.43	6.33	6.27	6.14	6.10	6.08	6.02	
6	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52	5.46	5.37	5.27	5.17	5.11	4.98	4.94	4.92	4.85	
7	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82	4.76	4.67	4.57	4.47	4.40	4.28	4.23	4.21	4.14	
8	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36	4.30	4.20	4.10	4.00	3.94	3.81	3.76	3.74	3.67	
9	7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03	3.96	3.87	3.77	3.67	3.60	3.47	3.43	3.40	3.33	
10	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78	3.72	3.62	3.52	3.42	3.35	3.22	3.18	3.15	3.08	
11	6.72	5.26	4.63	4.28	4.04	3.88	3.76	3.66	3.59	3.53	3.43	3.33	3.23	3.16	3.03	2.98	2.96	2.88	
12	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.44	3.37	3.28	3.18	3.07	3.01	2.87	2.82	2.80	2.73	
13	6.41	4.97	4.35	4.00	3.77	3.60	3.48	3.39	3.31	3.25	3.15	3.05	2.95	2.88	2.74	2.70	2.67	2.60	
14	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21	3.15	3.05	2.95	2.84	2.78	2.64	2.59	2.56	2.49	
15	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12	3.06	2.96	2.86	2.76	2.69	2.55	2.50	2.47	2.40	
16	6.12	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05	2.99	2.89	2.79	2.68	2.61	2.47	2.42	2.40	2.32	
17	6.04	4.62	4.01	3.66	3.44	3.28	3.16	3.06	2.98	2.92	2.82	2.72	2.62	2.55	2.41	2.35	2.33	2.25	
18	5.98	4.56	3.95	3.61	3.38	3.22	3.10	3.01	2.93	2.87	2.77	2.67	2.56	2.49	2.35	2.30	2.27	2.19	
19	5.92	4.51	3.90	3.56	3.33	3.17	3.05	2.96	2.88	2.82	2.72	2.62	2.51	2.44	2.30	2.24	2.22	2.13	
20	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84	2.77	2.68	2.57	2.46	2.40	2.25	2.20	2.17	2.09	
21	5.83	4.42	3.82	3.48	3.25	3.09	2.97	2.87	2.80	2.73	2.64	2.53	2.42	2.36	2.21	2.16	2.13	2.04	
22	5.79	4.38	3.78	3.44	3.22	3.05	2.93	2.84	2.76	2.70	2.60	2.50	2.39	2.32	2.17	2.12	2.09	2.00	
23	5.75	4.35	3.75	3.41	3.18	3.02	2.90	2.81	2.73	2.67	2.57	2.47	2.36	2.29	2.14	2.08	2.06	1.97	
24	5.72	4.32	3.72	3.38	3.15	2.99	2.87	2.78	2.70	2.64	2.54	2.44	2.33	2.26	2.11	2.05	2.02	1.94	
25	5.69	4.29	3.69	3.35	3.13	2.97	2.85	2.75	2.68	2.61	2.51	2.41	2.30	2.23	2.08	2.02	2.00	1.91	
26	5.66	4.27	3.67	3.33	3.10	2.94	2.82	2.73	2.65	2.59	2.49	2.39	2.28	2.21	2.05	2.00	1.97	1.88	
27	5.63	4.24	3.65	3.31	3.08	2.92	2.80	2.71	2.63	2.57	2.47	2.36	2.25	2.18	2.03	1.97	1.94	1.85	
28	5.61	4.22	3.63	3.29	3.06	2.90	2.78	2.69	2.61	2.55	2.45	2.34	2.23	2.16	2.01	1.95	1.92	1.83	
29	5.59	4.20	3.61	3.27	3.04	2.88	2.76	2.67	2.59	2.53	2.43	2.32	2.21	2.14	1.99	1.93	1.90	1.81	
30	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65	2.57	2.51	2.41	2.31	2.20	2.12	1.97	1.91	1.88	1.79	
40	5.42	4.05	3.46	3.13	2.90	2.74	2.62	2.53	2.45	2.39	2.29	2.18	2.07	1.99	1.83	1.77	1.74	1.64	
60	5.29	3.93	3.34	3.01	2.79	2.63	2.51	2.41	2.33	2.27	2.17	2.06	1.94	1.87	1.70	1.63	1.60	1.48	
80	5.22	3.86	3.28	2.95	2.73	2.57	2.45	2.35	2.28	2.21	2.11	2.00	1.88	1.81	1.63	1.56	1.53	1.40	
100	5.18	3.83	3.25	2.92	2.70	2.54	2.42	2.32	2.24	2.18	2.08	1.97	1.85	1.77	1.59	1.52	1.48	1.35	
120	5.15	3.80	3.23	2.89	2.67	2.52	2.39	2.30	2.22	2.16	2.05	1.94	1.82	1.75	1.56	1.49	1.45	1.31	
∞	5.03	3.69	3.12	2.79	2.57	2.41	2.29	2.19	2.11	2.05	1.95	1.83	1.71	1.63	1.43	1.35	1.30	1.04	

Tabla 9D. Valores críticos $F_{(\alpha;n_1,n_2)}$ de la distribución F .

n_2	$p = 0.99$										$\alpha = 0.01$								
	n_1																		
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	50	75	100	∞	
1	4052.	4999.	5403.	5625.	5764.	5859.	5928.	5981.	6022.	6056.	6106.	6157.	6209.	6240.	6303.	6324.	6334.	6366.	
2	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40	99.42	99.43	99.45	99.46	99.48	99.49	99.49	99.50	
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23	27.05	26.87	26.69	26.58	26.35	26.28	26.24	26.13	
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.37	14.20	14.02	13.91	13.69	13.61	13.58	13.46	
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.89	9.72	9.55	9.45	9.24	9.17	9.13	9.02	
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.72	7.56	7.40	7.30	7.09	7.02	6.99	6.88	
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.47	6.31	6.16	6.06	5.86	5.79	5.75	5.65	
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.67	5.52	5.36	5.26	5.07	5.00	4.96	4.86	
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.11	4.96	4.81	4.71	4.52	4.45	4.41	4.31	
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.71	4.56	4.41	4.31	4.12	4.05	4.01	3.91	
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.40	4.25	4.10	4.01	3.81	3.74	3.71	3.60	
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.16	4.01	3.86	3.76	3.57	3.50	3.47	3.36	
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.96	3.82	3.66	3.57	3.38	3.31	3.27	3.17	
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.80	3.66	3.51	3.41	3.22	3.15	3.11	3.01	
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.67	3.52	3.37	3.28	3.08	3.01	2.98	2.87	
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.55	3.41	3.26	3.16	2.97	2.90	2.86	2.75	
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.46	3.31	3.16	3.07	2.87	2.80	2.76	2.65	
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.37	3.23	3.08	2.98	2.78	2.71	2.68	2.57	
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.30	3.15	3.00	2.91	2.71	2.64	2.60	2.49	
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.23	3.09	2.94	2.84	2.64	2.57	2.54	2.42	
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.17	3.03	2.88	2.79	2.58	2.51	2.48	2.36	
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.12	2.98	2.83	2.73	2.53	2.46	2.42	2.31	
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.07	2.93	2.78	2.69	2.48	2.41	2.37	2.26	
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.03	2.89	2.74	2.64	2.44	2.37	2.33	2.21	
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	2.99	2.85	2.70	2.60	2.40	2.33	2.29	2.17	
26	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18	3.09	2.96	2.81	2.66	2.57	2.36	2.29	2.25	2.13	
27	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15	3.06	2.93	2.78	2.63	2.54	2.33	2.26	2.22	2.10	
28	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12	3.03	2.90	2.75	2.60	2.51	2.30	2.23	2.19	2.07	
29	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09	3.00	2.87	2.73	2.57	2.48	2.27	2.20	2.16	2.04	
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.84	2.70	2.55	2.45	2.25	2.17	2.13	2.01	
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.66	2.52	2.37	2.27	2.06	1.98	1.94	1.81	
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.50	2.35	2.20	2.10	1.88	1.79	1.75	1.60	
80	6.96	4.88	4.04	3.56	3.26	3.04	2.87	2.74	2.64	2.55	2.42	2.27	2.12	2.01	1.79	1.70	1.65	1.50	
100	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.59	2.50	2.37	2.22	2.07	1.97	1.74	1.65	1.60	1.43	
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.34	2.19	2.03	1.93	1.70	1.61	1.56	1.38	
∞	6.64	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.19	2.04	1.88	1.77	1.53	1.42	1.36	1.05	

Tabla 9E. Valores críticos $F_{(\alpha; n_1, n_2)}$ de la distribución F .

n_2	$p = 0.995$																$\alpha = 0.005$					
	1	2	3	4	5	6	7	8	9	10	12	15	20	25	50	75	100	100	100	100	100	∞
1	16211.	19999.	21615.	22500.	23056.	23437.	23715.	23925.	24091.	24224.	24426.	24630.	24836.	24960.	25211.	25295.	25337.	25337.	25337.	25337.	25337.	25463.
2	198.50	199.00	199.17	199.25	199.30	199.33	199.36	199.37	199.39	199.40	199.42	199.43	199.45	199.46	199.48	199.49	199.49	199.49	199.49	199.49	199.50	199.50
3	55.55	49.80	47.47	46.19	45.39	44.84	44.43	44.13	43.88	43.69	43.39	43.08	42.78	42.59	42.21	42.09	42.02	42.02	42.02	42.02	41.83	41.83
4	31.33	26.28	24.26	23.15	22.46	21.97	21.62	21.35	21.14	20.97	20.70	20.44	20.17	20.00	19.67	19.55	19.50	19.50	19.50	19.50	19.33	19.33
5	22.78	18.31	16.53	15.56	14.94	14.51	14.20	13.96	13.77	13.62	13.38	13.15	12.90	12.76	12.45	12.35	12.30	12.30	12.30	12.30	12.15	12.15
6	18.63	14.54	12.92	12.03	11.46	11.07	10.79	10.57	10.39	10.25	10.03	9.81	9.59	9.45	9.17	9.07	9.03	9.03	9.03	9.03	8.88	8.88
7	16.24	12.40	10.88	10.05	9.52	9.16	8.89	8.68	8.51	8.38	8.18	7.97	7.75	7.62	7.35	7.26	7.22	7.22	7.22	7.22	7.08	7.08
8	14.69	11.04	9.60	8.81	8.30	7.95	7.69	7.50	7.34	7.21	7.01	6.81	6.61	6.48	6.22	6.13	6.09	6.09	6.09	6.09	5.95	5.95
9	13.61	10.11	8.72	7.96	7.47	7.13	6.88	6.69	6.54	6.42	6.23	6.03	5.83	5.71	5.45	5.37	5.32	5.32	5.32	5.32	5.19	5.19
10	12.83	9.43	8.08	7.34	6.87	6.54	6.30	6.12	5.97	5.85	5.66	5.47	5.27	5.15	4.90	4.82	4.77	4.77	4.77	4.77	4.64	4.64
11	12.23	8.91	7.60	6.88	6.42	6.10	5.86	5.68	5.54	5.42	5.24	5.05	4.86	4.74	4.49	4.40	4.36	4.36	4.36	4.36	4.23	4.23
12	11.75	8.51	7.23	6.52	6.07	5.76	5.52	5.35	5.20	5.09	4.91	4.72	4.53	4.41	4.17	4.08	4.04	4.04	4.04	4.04	3.91	3.91
13	11.37	8.19	6.93	6.23	5.79	5.48	5.25	5.08	4.94	4.82	4.64	4.46	4.27	4.15	3.91	3.82	3.78	3.78	3.78	3.78	3.65	3.65
14	11.06	7.92	6.68	6.00	5.56	5.26	5.03	4.86	4.72	4.60	4.43	4.25	4.06	3.94	3.70	3.61	3.57	3.57	3.57	3.57	3.44	3.44
15	10.80	7.70	6.48	5.80	5.37	5.07	4.85	4.67	4.54	4.42	4.25	4.07	3.88	3.77	3.52	3.44	3.39	3.39	3.39	3.39	3.26	3.26
16	10.58	7.51	6.30	5.64	5.21	4.91	4.69	4.52	4.38	4.27	4.10	3.92	3.73	3.62	3.37	3.29	3.25	3.25	3.25	3.25	3.11	3.11
17	10.38	7.35	6.16	5.50	5.07	4.78	4.56	4.39	4.25	4.14	3.97	3.79	3.61	3.49	3.25	3.16	3.12	3.12	3.12	3.12	2.99	2.99
18	10.22	7.21	6.03	5.37	4.96	4.66	4.44	4.28	4.14	4.03	3.86	3.68	3.50	3.38	3.14	3.05	3.01	3.01	3.01	3.01	2.87	2.87
19	10.07	7.09	5.92	5.27	4.85	4.56	4.34	4.18	4.04	3.93	3.76	3.59	3.40	3.29	3.04	2.96	2.91	2.91	2.91	2.91	2.78	2.78
20	9.94	6.99	5.82	5.17	4.76	4.47	4.26	4.09	3.96	3.85	3.68	3.50	3.32	3.20	2.96	2.87	2.83	2.83	2.83	2.83	2.69	2.69
21	9.83	6.89	5.73	5.09	4.68	4.39	4.18	4.01	3.88	3.77	3.60	3.43	3.24	3.13	2.88	2.80	2.75	2.75	2.75	2.75	2.62	2.62
22	9.73	6.81	5.65	5.02	4.61	4.32	4.11	3.94	3.81	3.70	3.54	3.36	3.18	3.06	2.82	2.73	2.69	2.69	2.69	2.69	2.55	2.55
23	9.63	6.73	5.58	4.95	4.54	4.26	4.05	3.88	3.75	3.64	3.47	3.30	3.12	3.00	2.76	2.67	2.62	2.62	2.62	2.62	2.49	2.49
24	9.55	6.66	5.52	4.89	4.49	4.20	3.99	3.83	3.69	3.59	3.42	3.25	3.06	2.95	2.70	2.61	2.57	2.57	2.57	2.57	2.43	2.43
25	9.48	6.60	5.46	4.84	4.43	4.15	3.94	3.78	3.64	3.54	3.37	3.20	3.01	2.90	2.65	2.56	2.52	2.52	2.52	2.52	2.38	2.38
26	9.41	6.54	5.41	4.79	4.38	4.10	3.89	3.73	3.60	3.49	3.33	3.15	2.97	2.85	2.61	2.52	2.47	2.47	2.47	2.47	2.33	2.33
27	9.34	6.49	5.36	4.74	4.34	4.06	3.85	3.69	3.56	3.45	3.28	3.11	2.93	2.81	2.57	2.48	2.43	2.43	2.43	2.43	2.29	2.29
28	9.28	6.44	5.32	4.70	4.30	4.02	3.81	3.65	3.52	3.41	3.25	3.07	2.89	2.77	2.53	2.44	2.39	2.39	2.39	2.39	2.25	2.25
29	9.23	6.40	5.28	4.66	4.26	3.98	3.77	3.61	3.48	3.38	3.21	3.04	2.86	2.74	2.49	2.40	2.36	2.36	2.36	2.36	2.21	2.21
30	9.18	6.35	5.24	4.62	4.23	3.95	3.74	3.58	3.45	3.34	3.18	3.01	2.82	2.71	2.46	2.37	2.32	2.32	2.32	2.32	2.18	2.18
40	8.83	6.07	4.98	4.37	3.99	3.71	3.51	3.35	3.22	3.12	2.95	2.78	2.60	2.48	2.23	2.14	2.09	2.09	2.09	2.09	1.93	1.93
60	8.49	5.79	4.73	4.14	3.76	3.49	3.29	3.13	3.01	2.90	2.74	2.57	2.39	2.27	2.01	1.91	1.86	1.86	1.86	1.86	1.69	1.69
80	8.33	5.67	4.61	4.03	3.65	3.39	3.19	3.03	2.91	2.80	2.64	2.47	2.29	2.17	1.90	1.80	1.75	1.75	1.75	1.75	1.57	1.57
100	8.24	5.59	4.54	3.96	3.59	3.33	3.13	2.97	2.85	2.74	2.58	2.41	2.23	2.11	1.84	1.74	1.68	1.68	1.68	1.68	1.49	1.49
120	8.18	5.54	4.50	3.92	3.55	3.28	3.09	2.93	2.81	2.71	2.54	2.37	2.19	2.07	1.80	1.69	1.64	1.64	1.64	1.64	1.43	1.43
∞	7.88	5.30	4.28	3.72	3.35	3.09	2.90	2.75	2.62	2.52	2.36	2.19	2.00	1.88	1.59	1.47	1.40	1.40	1.40	1.40	1.05	1.05

10. Distribución del estadístico d de Durbin-Watson

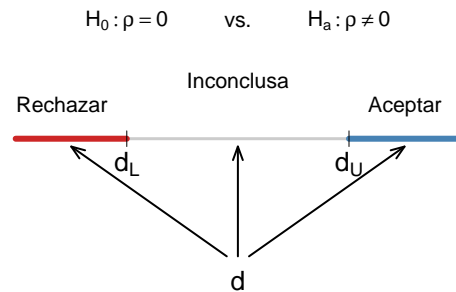
Se define el estadístico de Durbin-Watson

$$d = \frac{\sum_{i=2}^n (e_i - e_{i-1})^2}{\sum_{i=1}^n e_i^2}$$

donde los e_i son los residuales del modelo lineal

$$e_i = y_i - \hat{\beta}_0 - \hat{\beta}_1 x_{i1} - \dots - \hat{\beta}_k x_{ik},$$

con $i = 1, \dots, n$.



Prueba para autocorrelación positiva ($\rho > 0$) de significancia α :

Si	$d < dL_{(\alpha;n,k)}$	Los datos sugieren autocorrelación positiva
Si	$d > dU_{(\alpha;n,k)}$	No hay evidencia de autocorrelación positiva
Si	$dL_{(\alpha;n,k)} < d < dU_{(\alpha;n,k)}$	La prueba es inconcluyente

Prueba para autocorrelación negativa ($\rho < 0$) de significancia α :

Si	$4 - d < dL_{(\alpha;n,k)}$	Los datos sugieren autocorrelación negativa
Si	$4 - d > dU_{(\alpha;n,k)}$	No hay evidencia de autocorrelación negativa
Si	$dL_{(\alpha;n,k)} < 4 - d < dU_{(\alpha;n,k)}$	La prueba es inconcluyente

Prueba de dos colas para autocorrelación ($|\rho| > 0$) de significancia α :

Si	$d < dL_{(\frac{\alpha}{2};n,k)}$ 'o $4 - d < dL_{(\frac{\alpha}{2};n,k)}$	Los datos sugieren autocorrelación
Si	$d > dU_{(\frac{\alpha}{2};n,k)}$ 'o $4 - d > dU_{(\frac{\alpha}{2};n,k)}$	No hay evidencia de autocorrelación
	En otro caso	La prueba es inconcluyente

Tabla 10A.1 Cotas críticas $dL_{(\alpha,n,k)}$, $dU_{(\alpha,n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.01$	$k = 1$	$k = 2$	$k = 3$	$k = 4$	$k = 5$	$k = 6$	$k = 7$	$k = 8$	$k = 9$	$k = 10$	$k = 11$
n	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL
7	0.390	1.142	0.294	1.676	0.229	2.102	0.183	2.433	0.150	2.690	0.125
8	0.435	1.036	0.346	1.489	0.279	1.875	0.230	2.194	0.193	2.453	0.164
9	0.498	0.948	0.409	1.390	0.340	1.734	0.286	2.029	0.244	2.280	0.211
10	0.554	1.000	0.466	1.332	0.396	1.641	0.340	1.912	0.294	2.149	0.257
11	0.604	1.010	0.519	1.297	0.448	1.574	0.396	1.826	0.343	2.049	0.303
12	0.653	1.023	0.570	1.274	0.499	1.526	0.448	1.757	0.391	1.967	0.356
13	0.698	1.039	0.616	1.261	0.547	1.481	0.499	1.704	0.437	1.907	0.400
14	0.739	1.054	0.660	1.254	0.592	1.445	0.547	1.631	0.480	1.857	0.436
15	0.776	1.071	0.700	1.251	0.632	1.413	0.592	1.584	0.522	1.811	0.474
16	0.814	1.087	0.738	1.253	0.672	1.385	0.632	1.548	0.561	1.773	0.510
17	0.844	1.103	0.773	1.256	0.708	1.357	0.672	1.604	0.598	1.742	0.545
18	0.902	1.118	0.805	1.260	0.742	1.332	0.711	1.554	0.634	1.712	0.587
19	0.928	1.132	0.835	1.265	0.773	1.311	0.748	1.543	0.667	1.691	0.620
20	0.953	1.147	0.863	1.270	0.803	1.291	0.785	1.535	0.698	1.673	0.652
21	0.976	1.161	0.890	1.278	0.832	1.273	0.821	1.528	0.728	1.658	0.682
22	0.997	1.174	0.915	1.284	0.857	1.256	0.857	1.523	0.756	1.646	0.711
23	1.017	1.186	0.938	1.290	0.882	1.240	0.882	1.519	0.783	1.635	0.738
24	1.037	1.199	0.960	1.298	0.906	1.225	0.906	1.513	0.808	1.626	0.764
25	1.055	1.211	0.981	1.305	0.928	1.211	0.928	1.507	0.832	1.618	0.788
26	1.072	1.222	1.001	1.312	0.950	1.196	0.950	1.501	0.858	1.611	0.812
27	1.088	1.233	1.019	1.318	0.969	1.181	0.969	1.497	0.877	1.606	0.834
28	1.104	1.244	1.037	1.325	0.988	1.166	0.988	1.492	0.896	1.601	0.856
29	1.119	1.254	1.054	1.332	1.006	1.151	1.006	1.487	0.914	1.598	0.878
30	1.133	1.264	1.070	1.339	1.024	1.136	1.024	1.481	0.932	1.591	0.895
31	1.147	1.273	1.086	1.346	1.040	1.121	1.040	1.475	0.950	1.585	0.912
32	1.159	1.281	1.100	1.352	1.055	1.106	1.055	1.469	0.966	1.581	0.930
33	1.172	1.290	1.114	1.358	1.070	1.091	1.070	1.463	0.982	1.574	0.946
34	1.184	1.299	1.127	1.364	1.085	1.076	1.085	1.458	0.997	1.569	0.962
35	1.195	1.307	1.140	1.370	1.098	1.061	1.098	1.452	1.014	1.564	0.977
36	1.207	1.315	1.153	1.376	1.112	1.046	1.112	1.446	1.026	1.558	0.992
37	1.217	1.322	1.165	1.382	1.125	1.031	1.125	1.440	1.040	1.554	1.010
38	1.227	1.331	1.176	1.388	1.137	1.016	1.137	1.435	1.054	1.550	1.026
39	1.237	1.337	1.187	1.393	1.148	1.001	1.148	1.430	1.069	1.547	1.041
40	1.246	1.344	1.198	1.399	1.159	0.986	1.159	1.425	1.082	1.543	1.057
41	1.255	1.351	1.208	1.404	1.169	0.971	1.169	1.420	1.097	1.539	1.072
42	1.264	1.357	1.218	1.409	1.179	0.956	1.179	1.415	1.110	1.534	1.086
43	1.272	1.363	1.227	1.414	1.189	0.941	1.189	1.410	1.124	1.530	1.096
44	1.280	1.369	1.236	1.418	1.199	0.926	1.199	1.405	1.133	1.526	1.105
45	1.288	1.376	1.245	1.423	1.209	0.911	1.209	1.400	1.144	1.522	1.114
46	1.296	1.382	1.253	1.428	1.219	0.896	1.219	1.395	1.155	1.518	1.123
47	1.303	1.387	1.262	1.433	1.228	0.881	1.228	1.390	1.166	1.514	1.132
48	1.310	1.392	1.270	1.437	1.237	0.866	1.237	1.385	1.177	1.510	1.141
49	1.318	1.398	1.278	1.441	1.246	0.851	1.246	1.380	1.188	1.506	1.150
50	1.324	1.403	1.285	1.446	1.255	0.836	1.255	1.375	1.199	1.502	1.159
51	1.335	1.427	1.320	1.466	1.283	0.811	1.283	1.369	1.214	1.498	1.168
52	1.343	1.449	1.350	1.484	1.316	0.796	1.316	1.364	1.229	1.494	1.177
53	1.355	1.468	1.377	1.500	1.346	0.781	1.346	1.359	1.244	1.490	1.186
54	1.368	1.479	1.399	1.516	1.377	0.766	1.377	1.354	1.259	1.486	1.194
55	1.382	1.495	1.422	1.532	1.409	0.751	1.409	1.349	1.274	1.482	1.203
56	1.408	1.501	1.446	1.548	1.441	0.736	1.441	1.344	1.289	1.478	1.212
57	1.446	1.515	1.474	1.563	1.473	0.721	1.473	1.339	1.304	1.474	1.221
58	1.482	1.528	1.498	1.578	1.505	0.706	1.505	1.334	1.319	1.470	1.230
59	1.497	1.541	1.474	1.563	1.452	0.691	1.452	1.329	1.304	1.465	1.239
90	1.497	1.541	1.474	1.563	1.452	0.691	1.452	1.329	1.304	1.465	1.239
95	1.510	1.552	1.489	1.573	1.468	0.686	1.468	1.324	1.300	1.460	1.244
100	1.523	1.562	1.502	1.582	1.482	0.680	1.482	1.319	1.299	1.459	1.249
125	1.573	1.605	1.558	1.622	1.541	0.638	1.541	1.275	1.275	1.415	1.275
150	1.611	1.637	1.598	1.651	1.585	0.615	1.585	1.251	1.251	1.391	1.251
175	1.640	1.663	1.629	1.674	1.617	0.606	1.617	1.237	1.237	1.377	1.237
200	1.664	1.684	1.654	1.694	1.644	0.604	1.644	1.233	1.233	1.373	1.233

Tabla 10A.2 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.01$	$k = 12$		$k = 13$		$k = 14$		$k = 15$		$k = 16$		$k = 17$		$k = 18$		$k = 19$		$k = 20$		$k = 25$		$k = 30$	
n	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
17	0.053	3.506	0.047	3.557	0.043	3.601	0.038	3.639	0.035	3.671	0.032	3.700	0.029	3.725	0.027	3.747	0.025	3.766	0.023	3.782	0.021	3.799
18	0.075	3.358	0.067	3.420	0.061	3.474	0.055	3.521	0.050	3.562	0.046	3.598	0.042	3.629	0.039	3.657	0.036	3.682	0.033	3.706	0.030	3.729
19	0.102	3.227	0.093	3.297	0.084	3.358	0.077	3.412	0.070	3.459	0.065	3.501	0.060	3.538	0.055	3.572	0.051	3.602	0.047	3.629	0.043	3.657
20	0.131	3.109	0.093	3.297	0.084	3.358	0.077	3.412	0.070	3.459	0.065	3.501	0.060	3.538	0.055	3.572	0.051	3.602	0.047	3.629	0.043	3.657
21	0.162	3.004	0.119	3.185	0.109	3.252	0.100	3.311	0.092	3.363	0.085	3.416	0.079	3.465	0.073	3.512	0.067	3.557	0.061	3.602	0.055	3.647
22	0.194	2.909	0.148	3.084	0.136	3.155	0.125	3.218	0.116	3.274	0.107	3.326	0.100	3.371	0.093	3.416	0.087	3.461	0.080	3.506	0.074	3.551
23	0.227	2.822	0.178	2.991	0.165	3.065	0.152	3.218	0.141	3.191	0.131	3.245	0.122	3.294	0.114	3.338	0.107	3.383	0.100	3.428	0.093	3.473
24	0.260	2.744	0.209	2.906	0.194	2.982	0.180	3.051	0.167	3.112	0.156	3.169	0.146	3.220	0.137	3.268	0.129	3.310	0.121	3.352	0.113	3.394
25	0.292	2.674	0.241	2.829	0.224	2.896	0.209	2.976	0.194	3.040	0.182	3.098	0.171	3.152	0.162	3.201	0.153	3.246	0.144	3.288	0.135	3.329
26	0.325	2.609	0.272	2.759	0.254	2.836	0.237	2.907	0.222	2.972	0.209	3.032	0.196	3.086	0.184	3.137	0.175	3.224	0.166	3.266	0.156	3.307
27	0.356	2.551	0.303	2.694	0.283	2.772	0.267	2.843	0.252	2.972	0.237	2.912	0.224	3.081	0.211	3.132	0.200	3.183	0.189	3.234	0.179	3.275
28	0.387	2.499	0.333	2.635	0.313	2.713	0.295	2.843	0.277	2.851	0.261	2.912	0.246	2.969	0.233	3.022	0.221	3.071	0.209	3.122	0.198	3.171
29	0.418	2.451	0.364	2.582	0.342	2.659	0.324	2.785	0.304	2.796	0.287	2.858	0.272	2.915	0.257	2.969	0.244	3.019	0.232	3.069	0.221	3.120
30	0.447	2.407	0.393	2.532	0.370	2.609	0.352	2.730	0.331	2.746	0.313	2.808	0.297	2.865	0.282	2.919	0.269	3.024	0.257	3.074	0.244	3.099
31	0.475	2.367	0.422	2.487	0.398	2.562	0.380	2.680	0.357	2.699	0.339	2.761	0.322	2.819	0.306	2.872	0.292	2.923	0.279	2.974	0.266	3.025
32	0.503	2.330	0.450	2.446	0.426	2.520	0.407	2.633	0.383	2.655	0.365	2.717	0.348	2.774	0.330	2.828	0.315	2.879	0.302	2.920	0.288	2.971
33	0.530	2.296	0.477	2.407	0.452	2.481	0.434	2.589	0.409	2.614	0.390	2.675	0.371	2.733	0.354	2.786	0.338	2.837	0.324	2.878	0.310	3.029
34	0.556	2.265	0.503	2.373	0.478	2.444	0.459	2.549	0.433	2.576	0.414	2.637	0.395	2.694	0.377	2.747	0.361	2.799	0.346	2.850	0.332	3.031
35	0.581	2.237	0.529	2.340	0.498	2.478	0.479	2.549	0.452	2.576	0.433	2.637	0.414	2.694	0.395	2.747	0.379	2.800	0.361	2.852	0.346	3.033
36	0.605	2.210	0.554	2.310	0.504	2.410	0.486	2.478	0.459	2.614	0.438	2.675	0.419	2.733	0.400	2.771	0.383	2.823	0.367	2.874	0.352	3.035
37	0.628	2.187	0.577	2.282	0.528	2.379	0.480	2.478	0.452	2.576	0.433	2.637	0.414	2.694	0.395	2.747	0.379	2.800	0.361	2.852	0.346	3.033
38	0.651	2.164	0.601	2.256	0.552	2.350	0.504	2.445	0.478	2.549	0.461	2.566	0.441	2.623	0.422	2.676	0.405	2.726	0.388	2.837	0.371	3.038
39	0.673	2.143	0.623	2.231	0.575	2.323	0.528	2.414	0.482	2.549	0.461	2.566	0.441	2.623	0.422	2.676	0.405	2.726	0.388	2.837	0.371	3.038
40	0.694	2.123	0.646	2.210	0.598	2.297	0.551	2.386	0.505	2.476	0.484	2.534	0.464	2.590	0.445	2.643	0.428	2.693	0.411	2.744	0.394	3.040
41	0.715	2.105	0.666	2.189	0.619	2.273	0.573	2.360	0.528	2.449	0.506	2.504	0.484	2.540	0.464	2.590	0.445	2.643	0.428	2.693	0.411	3.040
42	0.734	2.088	0.687	2.169	0.641	2.251	0.594	2.335	0.550	2.419	0.528	2.476	0.506	2.504	0.484	2.540	0.464	2.590	0.445	2.643	0.428	3.040
43	0.753	2.073	0.707	2.150	0.661	2.230	0.616	2.312	0.571	2.393	0.549	2.450	0.528	2.504	0.506	2.530	0.487	2.582	0.469	2.631	0.452	3.041
44	0.771	2.058	0.726	2.134	0.680	2.211	0.636	2.289	0.592	2.369	0.569	2.424	0.548	2.477	0.528	2.554	0.508	2.582	0.487	2.582	0.469	3.041
45	0.790	2.044	0.744	2.118	0.699	2.192	0.655	2.269	0.612	2.346	0.586	2.441	0.569	2.477	0.548	2.540	0.528	2.554	0.508	2.582	0.487	3.041
46	0.807	2.031	0.762	2.103	0.718	2.176	0.675	2.250	0.632	2.325	0.609	2.401	0.586	2.477	0.548	2.540	0.528	2.554	0.508	2.582	0.487	3.041
47	0.824	2.020	0.780	2.089	0.736	2.159	0.694	2.231	0.651	2.305	0.628	2.378	0.609	2.401	0.586	2.477	0.548	2.540	0.528	2.554	0.508	3.041
48	0.840	2.008	0.797	2.076	0.754	2.144	0.712	2.214	0.670	2.286	0.647	2.338	0.628	2.378	0.609	2.401	0.586	2.477	0.548	2.540	0.528	3.041
49	0.856	1.998	0.813	2.063	0.771	2.130	0.729	2.198	0.688	2.267	0.667	2.318	0.647	2.338	0.628	2.378	0.609	2.401	0.586	2.477	0.548	3.041
50	0.871	1.987	0.829	2.051	0.787	2.116	0.746	2.183	0.705	2.250	0.685	2.318	0.667	2.338	0.647	2.338	0.628	2.378	0.609	2.401	0.586	3.041
51	0.886	1.975	0.846	2.002	0.803	2.058	0.764	2.117	0.723	2.176	0.703	2.236	0.685	2.318	0.667	2.338	0.647	2.338	0.628	2.378	0.609	3.041
52	0.900	1.964	0.864	1.963	0.829	2.015	0.783	2.067	0.741	2.119	0.723	2.236	0.703	2.236	0.685	2.318	0.667	2.338	0.647	2.338	0.628	3.041
53	0.914	1.950	0.884	1.935	0.846	1.981	0.802	2.027	0.759	2.075	0.736	2.123	0.716	2.123	0.694	2.222	0.703	2.222	0.681	2.222	0.659	3.041
54	0.928	1.935	0.902	1.911	0.863	1.963	0.824	1.981	0.783	2.015	0.764	2.123	0.746	2.123	0.723	2.222	0.703	2.222	0.681	2.222	0.659	3.041
55	0.940	1.914	0.920	1.879	0.884	1.935	0.846	1.963	0.802	1.995	0.783	2.049	0.764	2.123	0.746	2.123	0.723	2.222	0.703	2.222	0.681	3.041
56	0.954	1.890	0.940	1.856	0.902	1.903	0.863	1.940	0.824	1.963	0.802	2.049	0.802	1.999	0.929	1.999	0.908	1.999	0.887	1.999	0.865	3.041
57	0.968	1.870	0.968	1.837	0.918	1.886	0.902	1.903	0.884	1.940	0.863	2.049	0.846	2.049	0.824	2.049	0.802	2.049	0.783	2.049	0.764	3.041
58	0.982	1.856	0.982	1.823	0.937	1.866	0.902	1.903	0.896	1.965	0.918	1.999	0.918	1.999	0.940	1.999	0.929	1.999	0.908	1.999	0.887	3.041
59	0.996	1.844	1.000	1.809	0.951	1.851	0.918	1.903	0.920	1.965	0.937	1.999	0.902	1.999	0.940	1.999	0.929	1.999	0.908	1.999	0.887	3.041
60	1.010	1.835	1.014	1.800	0.965	1.841	0.937	1.903	0.920	1.965	0.937	1.999	0.918	1.999	0.940	1.999	0.929	1.999	0.908	1.999	0.887	3.041
61	1.024	1.826	1.028	1.795	0.979	1.832	0.951	1.903	0.908	1.965	0.918	1.999	0.902	1.999	0.940	1.999	0.929	1.999	0.908	1.999	0.887	3.041
62	1.038	1.818	1.042	1.787	0.991	1.824	0.965	1.903	0.920	1.965	0.937	1.999	0.918	1.999	0.940	1.999	0.929	1.999	0.908	1.999	0.887	3.041
63	1.052	1.810	1.056	1.779	1.000	1.816	0.979	1.903	0.937	1.965	0.937	1.999	0.918	1.999	0.940	1.999	0.929	1.999	0.908	1.999	0.887	3.041
64	1.066	1.8021																				

Tabla 10B.1 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

n	$\alpha = 0.025$		$k = 1$		$k = 2$		$k = 3$		$k = 4$		$k = 5$		$k = 6$		$k = 7$		$k = 8$		$k = 9$		$k = 10$		$k = 11$	
	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
6	0.489	1.258	0.372	1.775	0.291	2.184	0.234	2.502	0.191	2.749	0.160	2.943	0.135	3.096	0.116	3.220	0.100	3.320	0.087	3.403	0.077	3.471	0.070	3.521
7	0.564	1.191	0.450	1.629	0.365	1.997	0.302	2.300	0.253	2.545	0.215	2.745	0.185	2.909	0.160	3.044	0.140	3.156	0.124	3.251	0.110	3.331	0.100	3.396
8	0.633	1.172	0.520	1.547	0.434	1.878	0.366	2.158	0.312	2.394	0.269	2.592	0.234	2.758	0.206	2.899	0.182	3.018	0.162	3.119	0.145	3.206	0.135	3.271
9	0.690	1.164	0.581	1.493	0.496	1.791	0.425	2.050	0.369	2.275	0.322	2.468	0.284	2.633	0.252	2.775	0.225	2.897	0.202	3.003	0.182	3.095	0.165	3.182
10	0.744	1.173	0.640	1.456	0.555	1.725	0.484	1.966	0.425	2.178	0.376	2.363	0.334	2.535	0.345	2.572	0.313	2.699	0.290	2.790	0.265	2.898	0.245	2.993
11	0.798	1.183	0.694	1.433	0.609	1.677	0.538	1.900	0.478	2.099	0.427	2.276	0.384	2.451	0.390	2.491	0.356	2.612	0.325	2.720	0.299	2.903	0.270	2.998
12	0.838	1.196	0.742	1.418	0.660	1.642	0.589	1.848	0.478	2.036	0.475	2.243	0.430	2.418	0.433	2.459	0.398	2.540	0.366	2.646	0.337	2.744	0.305	2.839
13	0.878	1.212	0.787	1.405	0.707	1.615	0.636	1.806	0.528	1.986	0.521	2.143	0.475	2.318	0.475	2.359	0.438	2.520	0.406	2.616	0.375	2.711	0.340	2.805
14	0.916	1.229	0.827	1.405	0.748	1.594	0.680	1.773	0.574	1.961	0.565	2.091	0.517	2.261	0.517	2.301	0.475	2.500	0.442	2.596	0.410	2.691	0.375	2.786
15	0.954	1.246	0.864	1.403	0.788	1.578	0.720	1.746	0.619	1.939	0.606	2.048	0.558	2.218	0.558	2.257	0.517	2.500	0.482	2.596	0.445	2.691	0.405	2.786
16	0.980	1.269	0.899	1.403	0.825	1.567	0.758	1.723	0.660	1.920	0.645	2.010	0.588	2.188	0.588	2.227	0.542	2.500	0.508	2.604	0.465	2.705	0.425	2.795
17	1.005	1.294	0.930	1.405	0.860	1.558	0.794	1.705	0.699	1.897	0.681	1.948	0.619	2.138	0.619	2.177	0.606	2.500	0.538	2.600	0.500	2.700	0.460	2.790
18	1.035	1.324	0.959	1.411	0.890	1.551	0.827	1.691	0.735	1.883	0.716	1.948	0.653	2.138	0.653	2.177	0.636	2.500	0.567	2.600	0.535	2.700	0.485	2.790
19	1.063	1.354	0.987	1.411	0.920	1.546	0.857	1.677	0.769	1.873	0.748	1.948	0.681	2.138	0.681	2.177	0.660	2.500	0.596	2.600	0.555	2.700	0.510	2.790
20	1.083	1.384	1.013	1.415	0.948	1.540	0.887	1.668	0.801	1.864	0.779	1.948	0.716	2.138	0.716	2.177	0.685	2.500	0.625	2.600	0.584	2.700	0.535	2.790
21	1.104	1.413	1.039	1.424	0.973	1.534	0.914	1.659	0.831	1.851	0.799	1.948	0.748	2.138	0.748	2.177	0.704	2.500	0.654	2.600	0.613	2.700	0.564	2.790
22	1.124	1.441	1.069	1.434	1.000	1.528	0.939	1.659	0.859	1.839	0.827	1.948	0.779	2.138	0.779	2.177	0.729	2.500	0.683	2.600	0.642	2.700	0.593	2.790
23	1.143	1.469	1.099	1.444	1.026	1.522	0.963	1.646	0.886	1.827	0.854	1.948	0.801	2.138	0.801	2.177	0.754	2.500	0.712	2.600	0.671	2.700	0.622	2.790
24	1.161	1.497	1.129	1.454	1.051	1.516	0.986	1.646	0.911	1.811	0.879	1.948	0.827	2.138	0.827	2.177	0.779	2.500	0.741	2.600	0.700	2.700	0.651	2.790
25	1.177	1.525	1.159	1.464	1.076	1.509	1.008	1.635	0.935	1.797	0.902	1.948	0.854	2.138	0.854	2.177	0.804	2.500	0.769	2.600	0.729	2.700	0.680	2.790
26	1.193	1.553	1.188	1.474	1.101	1.501	1.031	1.635	0.957	1.777	0.927	1.948	0.879	2.138	0.879	2.177	0.829	2.500	0.798	2.600	0.758	2.700	0.709	2.790
27	1.208	1.581	1.217	1.484	1.126	1.494	1.056	1.635	0.979	1.757	0.950	1.948	0.902	2.138	0.902	2.177	0.854	2.500	0.827	2.600	0.787	2.700	0.738	2.790
28	1.223	1.367	1.136	1.445	1.081	1.530	0.986	1.646	0.911	1.751	0.886	1.867	0.761	1.987	0.688	2.114	0.616	2.243	0.547	2.375	0.481	2.511	0.447	2.561
29	1.236	1.375	1.168	1.455	1.098	1.543	1.028	1.635	0.957	1.733	0.886	1.838	0.816	1.948	0.746	2.063	0.677	2.180	0.611	2.302	0.545	2.424	0.505	2.474
30	1.249	1.383	1.183	1.465	1.116	1.543	1.047	1.631	0.979	1.727	0.910	1.827	0.841	1.932	0.773	2.040	0.705	2.153	0.669	2.329	0.606	2.352	0.576	2.386
31	1.261	1.391	1.211	1.469	1.132	1.544	1.065	1.628	0.998	1.720	0.932	1.816	0.868	1.916	0.798	2.020	0.733	2.126	0.696	2.212	0.634	2.320	0.606	2.352
32	1.272	1.398	1.236	1.474	1.149	1.547	1.083	1.628	1.018	1.715	0.953	1.816	0.885	1.903	0.823	2.003	0.759	2.108	0.696	2.212	0.634	2.320	0.606	2.352
33	1.284	1.406	1.263	1.479	1.167	1.548	1.100	1.627	1.037	1.711	0.973	1.799	0.931	1.891	0.847	1.987	0.784	2.085	0.722	2.187	0.661	2.291	0.661	2.291
34	1.295	1.413	1.286	1.483	1.176	1.550	1.116	1.626	1.054	1.703	0.992	1.791	0.931	1.880	0.869	1.973	0.800	2.066	0.747	2.164	0.687	2.264	0.687	2.264
35	1.305	1.420	1.305	1.488	1.190	1.553	1.131	1.626	1.071	1.703	1.011	1.785	0.950	1.870	0.890	1.957	0.830	2.049	0.771	2.143	0.712	2.240	0.712	2.240
36	1.315	1.426	1.325	1.492	1.215	1.557	1.145	1.626	1.087	1.700	1.028	1.778	0.979	1.860	0.910	1.945	0.852	2.033	0.794	2.124	0.736	2.216	0.736	2.216
37	1.324	1.433	1.343	1.497	1.231	1.557	1.159	1.626	1.102	1.697	1.045	1.773	0.987	1.852	0.930	1.934	0.873	2.019	0.816	2.106	0.759	2.195	0.759	2.195
38	1.333	1.439	1.360	1.501	1.249	1.557	1.172	1.626	1.117	1.695	1.061	1.768	1.005	1.845	0.949	1.923	0.893	2.006	0.837	2.089	0.781	2.175	0.781	2.175
39	1.342	1.445	1.379	1.506	1.268	1.562	1.185	1.626	1.131	1.693	1.077	1.764	1.022	1.837	0.967	1.914	0.912	1.993	0.857	2.074	0.803	2.157	0.803	2.157
40	1.350	1.451	1.390	1.506	1.284	1.564	1.197	1.626	1.145	1.692	1.091	1.760	1.038	1.831	0.984	1.905	0.930	1.981	0.877	2.064	0.824	2.140	0.824	2.140
41	1.359	1.457	1.409	1.510	1.260	1.567	1.209	1.627	1.158	1.689	1.106	1.753	1.053	1.825	1.001	1.897	0.948	1.970	0.896	2.046	0.844	2.125	0.844	2.125
42	1.366	1.462	1.431	1.514	1.270	1.569	1.220	1.628	1.170	1.689	1.119	1.753	1.068	1.819	1.017	1.889	0.966	1.961	0.914	2.034	0.863	2.110	0.863	2.110
43	1.373	1.467	1.327	1.518	1.279	1.572	1.231	1.628	1.182	1.688	1.132	1.750	1.082	1.815	1.032	1.882	0.982	1.951	0.931	2.023	0.881	2.083	0.881	2.083
44	1.381	1.472	1.335	1.522	1.289	1.574	1.242	1.629	1.194	1.688	1.145	1.748	1.096	1.810	1.047	1.876	0.997	1.943	0.948	2.012	0.899	2.095	0.899	2.095
45	1.388	1.477	1.343	1.525	1.298	1.576	1.252	1.631	1.205	1.687	1.157	1.746	1.109	1.806	1.061	1.864	1.027	1.935	0.964	2.002	0.916	2.071	0.916	2.071
46	1.395	1.482	1.351	1.529	1.306	1.579	1.262	1.632	1.215	1.686	1.167	1.743	1.122	1.803	1.075	1.864	1.042	1.935	0.980	1.992	0.932	2.059	0.932	2.059
47	1.401	1.487	1.358	1.533	1.315	1.581	1.271	1.633	1.226	1.686	1.180	1.741	1.135	1.799	1.088	1.859	1.058	1.945	1.009	1.9				

Tabla 10B.2 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.025$	$k = 12$	$k = 13$	$k = 14$	$k = 15$	$k = 16$	$k = 17$	$k = 18$	$k = 19$	$k = 20$	$k = 25$	$k = 30$
n	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL
17	0.068	3.529	0.061	3.578	0.055	3.619	0.050	3.655	0.041	3.714	0.038
18	0.099	3.399	0.089	3.457	0.080	3.507	0.073	3.551	0.061	3.623	0.053
19	0.131	3.281	0.119	3.347	0.108	3.404	0.098	3.454	0.083	3.537	0.073
20	0.165	3.175	0.150	3.245	0.138	3.307	0.126	3.362	0.107	3.454	0.092
21	0.202	3.077	0.184	3.151	0.169	3.217	0.156	3.275	0.134	3.375	0.116
22	0.238	2.985	0.219	3.063	0.203	3.133	0.187	3.251	0.161	3.359	0.141
23	0.275	2.905	0.254	2.984	0.235	3.055	0.219	3.194	0.190	3.329	0.166
24	0.312	2.831	0.289	2.911	0.269	2.983	0.251	3.048	0.229	3.300	0.190
25	0.348	2.764	0.324	2.844	0.302	2.917	0.282	2.983	0.264	3.272	0.214
26	0.383	2.703	0.358	2.782	0.335	2.855	0.314	2.922	0.294	3.244	0.238
27	0.417	2.647	0.391	2.726	0.367	2.799	0.345	2.866	0.324	3.216	0.262
28	0.451	2.596	0.423	2.674	0.398	2.747	0.375	2.843	0.353	3.187	0.286
29	0.483	2.549	0.455	2.626	0.429	2.698	0.405	2.814	0.382	3.159	0.310
30	0.514	2.506	0.485	2.582	0.459	2.653	0.435	2.786	0.406	3.132	0.334
31	0.545	2.467	0.515	2.542	0.488	2.612	0.463	2.750	0.435	3.105	0.358
32	0.573	2.430	0.544	2.504	0.516	2.574	0.491	2.714	0.463	3.078	0.382
33	0.602	2.397	0.572	2.470	0.543	2.537	0.518	2.682	0.491	3.051	0.406
34	0.628	2.366	0.598	2.437	0.570	2.504	0.544	2.648	0.518	3.024	0.430
35	0.655	2.338	0.624	2.407	0.596	2.473	0.569	2.614	0.544	3.000	0.454
36	0.680	2.311	0.649	2.379	0.621	2.444	0.593	2.586	0.569	2.978	0.478
37	0.704	2.286	0.673	2.353	0.645	2.417	0.617	2.559	0.593	2.956	0.502
38	0.727	2.264	0.696	2.329	0.668	2.391	0.640	2.532	0.617	2.934	0.526
39	0.749	2.243	0.719	2.307	0.690	2.368	0.662	2.505	0.640	2.912	0.550
40	0.771	2.222	0.740	2.285	0.712	2.345	0.684	2.478	0.662	2.890	0.574
41	0.792	2.204	0.761	2.266	0.732	2.324	0.705	2.451	0.684	2.868	0.598
42	0.812	2.187	0.781	2.247	0.753	2.305	0.725	2.424	0.705	2.846	0.622
43	0.831	2.171	0.801	2.229	0.772	2.286	0.745	2.397	0.725	2.824	0.646
44	0.850	2.155	0.820	2.213	0.791	2.269	0.764	2.370	0.745	2.802	0.670
45	0.868	2.141	0.838	2.198	0.810	2.252	0.782	2.343	0.764	2.780	0.694
46	0.885	2.128	0.856	2.183	0.827	2.236	0.801	2.316	0.782	2.758	0.718
47	0.902	2.115	0.873	2.169	0.844	2.222	0.818	2.289	0.801	2.736	0.742
48	0.918	2.103	0.889	2.156	0.861	2.207	0.836	2.262	0.818	2.714	0.766
49	0.934	2.092	0.905	2.144	0.878	2.193	0.853	2.248	0.836	2.692	0.790
50	0.949	2.082	0.920	2.132	0.895	2.180	0.870	2.235	0.853	2.670	0.814
55	1.018	2.037	0.978	2.092	0.937	2.148	0.906	2.205	0.906	2.624	0.868
60	1.077	2.002	1.039	2.051	1.002	2.102	0.965	2.153	0.965	2.578	0.922
65	1.129	1.975	1.094	2.020	1.059	2.065	1.024	2.111	1.024	2.532	0.976
70	1.173	1.954	1.141	1.994	1.109	2.035	1.076	2.077	1.076	2.486	1.030
75	1.213	1.936	1.183	1.973	1.153	2.011	1.122	2.049	1.122	2.440	1.084
80	1.249	1.922	1.221	1.957	1.192	1.991	1.163	2.026	1.163	2.394	1.138
85	1.281	1.911	1.254	1.943	1.227	1.975	1.200	2.007	1.200	2.348	1.192
90	1.309	1.901	1.284	1.931	1.259	1.961	1.233	1.991	1.233	2.302	1.246
95	1.335	1.893	1.311	1.921	1.313	1.949	1.263	1.977	1.263	2.256	1.300
100	1.358	1.887	1.336	1.913	1.331	1.939	1.290	1.965	1.290	2.210	1.354
125	1.450	1.866	1.433	1.886	1.415	1.906	1.397	1.926	1.397	2.164	1.408
150	1.515	1.857	1.500	1.873	1.485	1.889	1.471	1.905	1.471	2.118	1.462
175	1.563	1.854	1.550	1.867	1.538	1.880	1.525	1.894	1.525	2.072	1.516
200	1.600	1.853	1.589	1.864	1.578	1.876	1.567	1.887	1.567	2.026	1.570

Tabla 10C.1 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.05$	$k = 1$	$k = 2$	$k = 3$	$k = 4$	$k = 5$	$k = 6$	$k = 7$	$k = 8$	$k = 9$	$k = 10$	$k = 11$												
n	dL	dU	dL	dU	dL	dL	dL	dL	dL	dL	dU												
6	0.611	1.401																					
7	0.699	1.356	0.467	1.896																			
8	0.763	1.332	0.559	1.777	0.367	2.286																	
9	0.824	1.320	0.629	1.697	0.455	2.128	0.295	2.588															
10	0.879	1.319	0.697	1.641	0.525	2.017	0.376	2.414	0.243	2.821													
11	0.927	1.324	0.758	1.604	0.595	1.928	0.444	2.283	0.316	2.645	0.203	3.005	0.172	3.149									
12	0.971	1.331	0.812	1.579	0.658	1.864	0.512	2.176	0.379	2.506	0.268	2.832	0.230	2.985	0.147	3.266							
13	1.010	1.340	0.861	1.562	0.715	1.816	0.575	2.094	0.444	2.389	0.328	2.692	0.285	2.847	0.200	3.111	0.127	3.360					
14	1.045	1.351	0.905	1.550	0.767	1.779	0.635	1.977	0.505	2.296	0.389	2.571	0.285	2.727	0.251	2.979	0.175	3.216	0.155	3.304	0.098		
15	1.077	1.361	0.945	1.543	0.814	1.750	0.685	1.935	0.562	2.220	0.447	2.472	0.339	2.624	0.304	2.860	0.222	3.089	0.155	3.304	0.138		
16	1.106	1.371	0.982	1.539	0.857	1.728	0.734	1.901	0.615	2.157	0.502	2.388	0.398	2.536	0.357	2.757	0.272	2.974	0.198	3.184	0.138		
17	1.133	1.382	1.016	1.536	0.897	1.710	0.779	1.858	0.664	2.104	0.554	2.317	0.451	2.536	0.407	2.667	0.321	2.873	0.244	3.074	0.177		
18	1.158	1.391	1.046	1.535	0.933	1.686	0.820	1.848	0.752	2.022	0.603	2.258	0.549	2.396	0.456	2.589	0.369	2.783	0.264	3.074	0.177		
19	1.180	1.401	1.074	1.535	0.967	1.676	0.859	1.828	0.792	1.991	0.632	2.162	0.594	2.339	0.502	2.521	0.416	2.704	0.336	2.885	0.163		
20	1.202	1.411	1.100	1.537	0.997	1.669	0.897	1.812	0.829	1.964	0.673	2.124	0.637	2.290	0.546	2.461	0.461	2.634	0.380	2.806	0.307		
21	1.221	1.420	1.125	1.539	1.026	1.663	0.927	1.802	0.863	1.940	0.709	2.090	0.677	2.246	0.588	2.407	0.504	2.570	0.424	2.734	0.349		
22	1.239	1.429	1.147	1.541	1.054	1.665	0.957	1.797	0.895	1.920	0.804	2.061	0.715	2.208	0.628	2.360	0.545	2.515	0.466	2.670	0.391		
23	1.256	1.437	1.168	1.543	1.078	1.660	0.986	1.786	0.925	1.920	0.837	2.035	0.751	2.174	0.666	2.318	0.584	2.464	0.506	2.613	0.431		
24	1.272	1.446	1.188	1.546	1.101	1.656	1.013	1.775	0.953	1.886	0.868	2.013	0.784	2.144	0.702	2.280	0.621	2.419	0.544	2.560	0.470		
25	1.287	1.453	1.206	1.549	1.123	1.654	1.038	1.767	0.979	1.873	0.897	1.993	0.816	2.118	0.736	2.246	0.657	2.379	0.581	2.513	0.508		
26	1.302	1.461	1.223	1.552	1.143	1.652	1.062	1.759	0.979	1.873	0.897	1.975	0.845	2.093	0.767	2.216	0.690	2.342	0.616	2.470	0.544		
27	1.316	1.469	1.240	1.556	1.162	1.651	1.084	1.753	1.004	1.861	0.925	1.958	0.874	2.071	0.798	2.189	0.722	2.308	0.642	2.431	0.579		
28	1.329	1.476	1.255	1.560	1.180	1.650	1.105	1.742	1.028	1.850	0.950	1.944	0.901	2.052	0.827	2.164	0.753	2.278	0.682	2.396	0.612		
29	1.341	1.483	1.270	1.563	1.197	1.650	1.124	1.738	1.051	1.841	0.975	1.944	0.926	2.035	0.853	2.141	0.782	2.251	0.712	2.363	0.643		
30	1.352	1.489	1.284	1.567	1.214	1.650	1.142	1.735	1.071	1.833	0.998	1.931	0.949	2.018	0.879	2.120	0.810	2.226	0.741	2.333	0.674		
31	1.363	1.496	1.297	1.570	1.229	1.650	1.160	1.735	1.090	1.825	1.020	1.920	0.969	2.004	0.904	2.102	0.836	2.203	0.769	2.306	0.703		
32	1.373	1.502	1.309	1.574	1.244	1.650	1.177	1.732	1.109	1.819	1.041	1.909	0.972	2.004	0.928	2.085	0.861	2.182	0.796	2.280	0.731		
33	1.383	1.508	1.321	1.577	1.258	1.651	1.193	1.730	1.127	1.813	1.061	1.900	0.994	1.991	0.950	2.069	0.885	2.162	0.821	2.257	0.758		
34	1.393	1.514	1.333	1.581	1.271	1.652	1.208	1.728	1.144	1.808	1.079	1.891	1.015	1.978	0.971	2.054	0.908	2.144	0.845	2.236	0.783		
35	1.402	1.519	1.343	1.584	1.283	1.653	1.222	1.726	1.160	1.803	1.098	1.884	1.034	1.968	0.991	2.041	0.930	2.127	0.868	2.216	0.808		
36	1.411	1.525	1.354	1.587	1.296	1.654	1.236	1.725	1.175	1.799	1.114	1.876	1.053	1.957	0.991	2.029	0.951	2.112	0.891	2.198	0.831		
37	1.419	1.530	1.364	1.591	1.307	1.655	1.249	1.723	1.190	1.795	1.131	1.870	1.071	1.948	1.011	2.029	0.971	2.098	0.912	2.180	0.853		
38	1.427	1.535	1.373	1.594	1.318	1.656	1.262	1.722	1.204	1.792	1.146	1.864	1.088	1.939	1.029	2.017	0.990	2.077	0.932	2.164	0.875		
39	1.435	1.540	1.382	1.597	1.328	1.658	1.274	1.722	1.217	1.789	1.161	1.859	1.104	1.932	1.047	2.007	1.008	2.072	0.952	2.149	0.896		
40	1.442	1.544	1.391	1.600	1.338	1.659	1.286	1.721	1.231	1.786	1.175	1.853	1.120	1.924	1.064	1.997	1.028	2.052	0.971	2.136	0.916		
41	1.450	1.549	1.399	1.603	1.348	1.660	1.296	1.721	1.243	1.784	1.189	1.849	1.135	1.918	1.080	1.988	1.042	2.050	0.988	2.123	0.935		
42	1.456	1.554	1.407	1.606	1.357	1.662	1.306	1.720	1.254	1.781	1.202	1.845	1.149	1.911	1.096	1.980	1.058	2.040	1.006	2.111	0.953		
43	1.463	1.558	1.415	1.609	1.366	1.663	1.316	1.720	1.266	1.779	1.215	1.841	1.163	1.906	1.111	1.972	1.058	2.040	1.022	2.099	0.971		
44	1.469	1.562	1.423	1.612	1.375	1.665	1.326	1.720	1.277	1.778	1.227	1.838	1.176	1.900	1.125	1.965	1.074	2.031	1.039	2.088	0.988		
45	1.475	1.566	1.430	1.615	1.383	1.666	1.336	1.720	1.287	1.776	1.239	1.835	1.189	1.895	1.139	1.958	1.089	2.022	1.054	2.078	1.004		
46	1.481	1.570	1.437	1.617	1.391	1.668	1.345	1.720	1.297	1.775	1.249	1.832	1.202	1.891	1.153	1.952	1.103	2.014	1.039	2.088	0.988		
47	1.487	1.574	1.444	1.620	1.399	1.669	1.353	1.720	1.308	1.774	1.261	1.829	1.213	1.887	1.165	1.945	1.117	2.006	1.069	2.069	1.020		
48	1.493	1.578	1.450	1.623	1.406	1.671	1.362	1.721	1.317	1.773	1.271	1.826	1.225	1.882	1.178	1.940	1.130	1.999	1.083	2.060	1.036		
49	1.498	1.581	1.457	1.626	1.414	1.672	1.370	1.721	1.326	1.772	1.281	1.824	1.235	1.879	1.190	1.935	1.143	1.992	1.097	2.052	1.050		
50	1.503	1.585	1.462	1.628	1.421	1.674	1.378	1.721	1.335	1.771	1.291	1.822	1.246	1.875	1.201	1.930	1.155	1.986	1.110	2.044	1.065		
55	1.527	1.601	1.490	1.641	1.452	1.681	1.414	1.724	1.374	1.768	1.334	1.813	1.294	1.861	1.253	1.909	1.212	1.959	1.171	2.010	1.129		
60	1.549	1.616	1.515	1.652	1.480	1.689	1.444	1.727	1.409	1.767	1.372	1.808	1.335	1.890	1.297	1.894	1.260	1.939	1.222	1.984	1.183		
65	1.567	1.630	1.536	1.662	1.504	1.696	1.471	1.731	1.438	1.767	1.404	1.805	1.370	1.843	1.336	1.883	1.301	1.923	1.266	1.964	1.231		
70	1.583	1.641	1.554	1.671	1.525	1.703	1.494	1.735	1.464	1.768	1.433	1.802	1.401	1.837	1.369	1.873	1.337	1.910	1.305	1.948	1.272		
75	1.598	1.652	1.571	1.680	1.543	1.709	1.515	1.739	1.487	1.770	1.458	1.801	1.428	1.834	1.399	1.867	1.369	1.901	1.339	1.935	1.308		
80	1.611	1.662																					

Tabla 10C.2 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.05$	n	$k = 12$		$k = 13$		$k = 14$		$k = 15$		$k = 16$		$k = 17$		$k = 18$		$k = 19$		$k = 20$		$k = 25$		$k = 30$	
		dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
	17	0.087	3.557																				
	18	0.123	3.442																				
	19	0.160	3.335	0.078	3.603	0.070	3.642																
	20	0.200	3.234	0.111	3.496	0.100	3.543	0.063	3.676														
	21	0.240	3.141	0.145	3.396	0.132	3.448	0.091	3.583	0.058	3.706												
	22	0.281	3.057	0.182	3.300	0.166	3.358	0.120	3.495	0.110	3.535	0.076	3.650										
	23	0.322	2.979	0.211	3.211	0.202	3.272	0.153	3.409	0.141	3.454	0.101	3.572	0.041	3.790								
	24	0.362	2.908	0.259	3.128	0.239	3.193	0.186	3.327	0.172	3.376	0.130	3.490	0.065	3.702	0.041	3.790						
	25	0.401	2.844	0.336	2.983	0.275	3.119	0.221	3.251	0.205	3.302	0.160	3.424	0.087	3.633	0.060	3.724						
	26	0.438	2.785	0.373	2.919	0.312	3.050	0.256	3.179	0.238	3.233	0.191	3.349	0.112	3.563	0.081	3.658						
	27	0.475	2.730	0.409	2.860	0.348	2.987	0.291	3.112	0.269	3.168	0.222	3.282	0.138	3.493	0.104	3.592						
	28	0.510	2.680	0.445	2.805	0.383	2.928	0.325	3.050	0.302	3.107	0.254	3.219	0.166	3.430	0.129	3.528						
	29	0.544	2.635	0.479	2.754	0.417	2.874	0.359	2.992	0.337	3.050	0.286	3.160	0.195	3.368	0.156	3.465	0.028	3.854				
	30	0.577	2.592	0.513	2.708	0.451	2.823	0.392	2.937	0.370	2.996	0.318	3.103	0.224	3.309	0.183	3.406	0.042	3.804				
	31	0.608	2.554	0.545	2.665	0.483	2.776	0.425	2.887	0.401	2.946	0.349	3.050	0.253	3.252	0.211	3.348	0.058	3.754				
	32	0.638	2.517	0.576	2.625	0.515	2.733	0.457	2.840	0.432	2.899	0.379	3.000	0.282	3.198	0.239	3.293	0.076	3.703				
	33	0.668	2.484	0.605	2.588	0.545	2.692	0.488	2.796	0.462	2.854	0.410	2.954	0.312	3.147	0.267	3.240	0.095	3.652				
	34	0.695	2.453	0.634	2.554	0.575	2.654	0.518	2.754	0.492	2.813	0.439	2.909	0.340	3.099	0.295	3.190	0.115	3.601	0.021	3.892		
	35	0.722	2.425	0.662	2.522	0.604	2.619	0.547	2.716	0.492	2.813	0.439	2.909	0.340	3.099	0.295	3.190	0.115	3.601	0.021	3.892		
	36	0.748	2.399	0.688	2.492	0.631	2.585	0.575	2.680	0.520	2.774	0.467	2.868	0.445	2.961	0.369	3.053	0.137	3.551	0.031	3.854		
	37	0.772	2.374	0.714	2.464	0.657	2.555	0.602	2.646	0.548	2.738	0.495	2.829	0.445	2.919	0.396	3.009	0.159	3.503	0.043	3.815		
	38	0.796	2.351	0.739	2.438	0.683	2.526	0.628	2.615	0.575	2.703	0.523	2.792	0.472	2.880	0.424	2.968	0.182	3.455	0.057	3.774		
	39	0.819	2.329	0.762	2.413	0.707	2.499	0.653	2.585	0.601	2.671	0.549	2.757	0.499	2.843	0.451	2.929	0.206	3.409	0.072	3.733		
	40	0.840	2.309	0.785	2.391	0.731	2.473	0.678	2.557	0.626	2.641	0.574	2.724	0.525	2.808	0.477	2.891	0.229	3.365	0.089	3.691		
	41	0.861	2.290	0.807	2.369	0.754	2.449	0.701	2.530	0.650	2.612	0.599	2.694	0.550	2.775	0.502	2.857	0.253	3.322	0.106	3.650		
	42	0.881	2.272	0.829	2.349	0.776	2.427	0.724	2.505	0.673	2.585	0.623	2.664	0.575	2.744	0.527	2.823	0.277	3.281	0.125	3.609		
	43	0.901	2.256	0.849	2.330	0.797	2.406	0.747	2.482	0.696	2.559	0.647	2.637	0.599	2.714	0.551	2.792	0.300	3.241	0.144	3.569		
	44	0.919	2.240	0.869	2.312	0.818	2.386	0.768	2.460	0.718	2.535	0.669	2.610	0.622	2.686	0.575	2.762	0.324	3.203	0.163	3.529		
	45	0.938	2.225	0.888	2.296	0.838	2.367	0.788	2.439	0.739	2.512	0.691	2.586	0.644	2.660	0.598	2.733	0.347	3.166	0.183	3.490		
	46	0.955	2.212	0.906	2.280	0.857	2.349	0.808	2.419	0.760	2.491	0.713	2.562	0.666	2.634	0.620	2.706	0.370	3.130	0.203	3.452		
	47	0.972	2.198	0.923	2.265	0.875	2.333	0.827	2.401	0.780	2.470	0.733	2.540	0.688	2.610	0.642	2.680	0.392	3.096	0.224	3.415		
	48	0.988	2.186	0.941	2.251	0.893	2.316	0.846	2.383	0.799	2.451	0.753	2.518	0.708	2.587	0.663	2.655	0.415	3.063	0.244	3.379		
	49	1.003	2.174	0.957	2.237	0.910	2.301	0.864	2.367	0.818	2.432	0.773	2.499	0.728	2.565	0.684	2.632	0.437	3.032	0.264	3.344		
	50	1.019	2.163	0.973	2.224	0.927	2.287	0.882	2.351	0.836	2.414	0.791	2.479	0.747	2.544	0.703	2.610	0.458	2.998	0.285	3.310		
	55	1.087	2.116	1.045	2.170	1.003	2.225	0.961	2.281	0.919	2.338	0.877	2.396	0.836	2.454	0.795	2.512	0.512	2.756	0.385	3.155		
	60	1.145	2.079	1.106	2.127	1.068	2.177	1.029	2.227	0.990	2.278	0.951	2.330	0.913	2.382	0.874	2.435	0.536	2.687	0.409	3.023		
	65	1.195	2.049	1.160	2.094	1.124	2.138	1.088	2.183	1.052	2.230	1.016	2.276	0.980	2.332	0.944	2.371	0.561	2.664	0.437	2.998		
	70	1.239	2.025	1.206	2.066	1.172	2.106	1.139	2.184	1.103	2.156	1.072	2.232	1.038	2.275	1.005	2.318	0.586	2.644	0.464	2.974		
	75	1.277	2.006	1.246	2.043	1.215	2.080	1.184	2.158	1.153	2.129	1.125	2.195	1.090	2.235	1.058	2.275	0.611	2.624	0.491	2.954		
	80	1.311	1.990	1.283	2.024	1.254	2.059	1.224	2.094	1.195	2.165	1.155	2.235	1.117	2.172	1.106	2.238	0.636	2.604	0.517	2.934		
	85	1.342	1.977	1.315	2.009	1.288	2.040	1.260	2.073	1.232	2.105	1.205	2.275	1.167	2.148	1.187	2.179	0.661	2.584	0.542	2.914		
	90	1.369	1.966	1.344	1.995	1.318	2.025	1.292	2.055	1.266	2.139	1.240	2.305	1.211	2.148	1.222	2.156	0.686	2.564	0.567	2.894		
	95	1.394	1.956	1.370	1.984	1.345	2.011	1.321	2.040	1.296	2.168	1.272	2.330	1.247	2.181	1.253	2.156	0.711	2.544	0.592	2.874		
	100	1.416	1.948	1.393	1.974	1.371	2.000	1.347	2.026	1.324	2.181	1.272	2.330	1.247	2.181	1.253	2.156	0.736	2.524	0.617	2.854		
	125	1.504	1.922	1.486	1.941	1.467	1.961	1.449	1.981	1.431	2.002	1.412	2.082	1.394	2.043	1.375	2.064	0.811	2.404	0.697	2.764		
	150	1.564	1.908	1.549	1.924	1.534	1.940	1.519	1.956	1.504	1.972	1.489	1.989	1.474	1.968	1.458	1.948	0.886	2.324	0.777	2.684		
	175	1.609	1.901	1.596	1.914	1.583	1.927	1.571	1.941	1.558	1.955	1.545	1.968	1.532	1.982	1.519	1.966	0.911	2.304	0.802	2.664		
	200	1.643	1.897	1.632	1.908	1.621	1.920	1.610	1.931	1.599	1.943	1.588	1.955	1.577	1.967	1.565	1.954	0.936	2.284	0.827	2.644		

Tabla 10D.1 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.10$	$k = 1$	$k = 2$	$k = 3$	$k = 4$	$k = 5$	$k = 6$	$k = 7$	$k = 8$	$k = 9$	$k = 10$	$k = 11$
n	dL	dL	dL	dL	dL	dL	dL	dL	dL	dL	dL
7	0.789	1.612	2.078	2.439	2.930	3.097	3.229	3.335	3.421	3.491	
8	0.836	1.567	1.970	2.298	2.774	2.945	3.084	3.199	3.294	3.374	1.129
9	0.896	1.530	1.881	2.181	2.637	2.809	2.953	3.053	3.147	3.221	1.172
10	0.937	1.516	1.825	2.097	2.558	2.730	2.874	2.974	3.067	3.157	1.212
11	0.966	1.511	1.786	2.033	2.499	2.671	2.815	2.915	3.007	3.097	1.236
12	1.006	1.513	1.963	2.132	2.669	2.841	2.985	3.085	3.177	3.267	1.270
13	1.137	1.516	1.737	2.185	2.638	2.810	2.954	3.054	3.146	3.236	1.314
14	1.172	1.522	1.944	2.250	2.726	2.900	3.044	3.144	3.236	3.326	1.347
15	1.204	1.528	1.993	2.282	2.776	2.950	3.094	3.194	3.286	3.376	1.380
16	1.260	1.534	1.127	2.052	2.824	3.002	3.146	3.246	3.338	3.428	1.413
17	1.284	1.541	1.159	2.095	2.867	3.045	3.189	3.289	3.381	3.471	1.446
18	1.306	1.547	1.188	2.118	2.888	3.068	3.212	3.312	3.404	3.494	1.479
19	1.326	1.554	1.214	2.168	2.930	3.110	3.254	3.354	3.446	3.536	1.512
20	1.345	1.560	1.238	2.188	2.955	3.135	3.279	3.379	3.471	3.561	1.545
21	1.362	1.566	1.261	2.211	2.978	3.158	3.302	3.402	3.494	3.584	1.578
22	1.378	1.573	1.281	2.234	2.999	3.180	3.324	3.424	3.516	3.606	1.611
23	1.393	1.578	1.300	2.256	3.019	3.202	3.340	3.440	3.532	3.628	1.644
24	1.406	1.584	1.318	2.277	3.036	3.219	3.357	3.457	3.549	3.649	1.677
25	1.420	1.589	1.335	2.297	3.053	3.236	3.374	3.474	3.566	3.670	1.710
26	1.432	1.595	1.350	2.317	3.068	3.251	3.389	3.489	3.581	3.681	1.743
27	1.444	1.600	1.365	2.336	3.082	3.266	3.402	3.502	3.594	3.694	1.776
28	1.455	1.606	1.379	2.354	3.095	3.279	3.415	3.515	3.607	3.707	1.809
29	1.465	1.610	1.392	2.371	3.107	3.291	3.427	3.527	3.619	3.719	1.842
30	1.475	1.615	1.404	2.388	3.118	3.302	3.438	3.538	3.630	3.730	1.875
31	1.484	1.619	1.415	2.404	3.128	3.312	3.448	3.548	3.640	3.740	1.908
32	1.492	1.624	1.426	2.419	3.137	3.316	3.458	3.558	3.650	3.750	1.941
33	1.501	1.628	1.437	2.434	3.146	3.319	3.467	3.567	3.660	3.760	1.974
34	1.509	1.632	1.447	2.448	3.154	3.321	3.476	3.576	3.670	3.770	2.007
35	1.517	1.636	1.456	2.461	3.162	3.323	3.484	3.584	3.680	3.780	2.040
36	1.524	1.640	1.465	2.474	3.169	3.325	3.491	3.591	3.690	3.790	2.073
37	1.531	1.644	1.474	2.486	3.176	3.327	3.498	3.598	3.698	3.798	2.106
38	1.538	1.648	1.482	2.497	3.182	3.328	3.504	3.604	3.704	3.804	2.139
39	1.544	1.651	1.491	2.508	3.187	3.329	3.509	3.609	3.709	3.809	2.172
40	1.551	1.654	1.498	2.518	3.191	3.330	3.513	3.613	3.713	3.813	2.205
41	1.557	1.658	1.505	2.527	3.194	3.331	3.516	3.616	3.716	3.816	2.238
42	1.562	1.661	1.512	2.536	3.196	3.332	3.518	3.618	3.718	3.818	2.271
43	1.568	1.664	1.519	2.544	3.198	3.333	3.520	3.620	3.720	3.820	2.304
44	1.573	1.667	1.526	2.551	3.199	3.334	3.521	3.621	3.721	3.821	2.337
45	1.578	1.670	1.532	2.558	3.200	3.335	3.522	3.622	3.722	3.822	2.370
46	1.583	1.673	1.538	2.564	3.201	3.336	3.523	3.623	3.723	3.823	2.403
47	1.588	1.676	1.544	2.570	3.202	3.337	3.524	3.624	3.724	3.824	2.436
48	1.593	1.679	1.549	2.575	3.203	3.338	3.525	3.625	3.725	3.825	2.469
49	1.597	1.681	1.555	2.580	3.204	3.339	3.526	3.626	3.726	3.826	2.502
50	1.602	1.684	1.560	2.584	3.205	3.340	3.527	3.627	3.727	3.827	2.535
51	1.606	1.687	1.564	2.588	3.206	3.341	3.528	3.628	3.728	3.828	2.568
52	1.610	1.690	1.568	2.591	3.207	3.342	3.529	3.629	3.729	3.829	2.601
53	1.614	1.693	1.572	2.594	3.208	3.343	3.530	3.630	3.730	3.830	2.634
54	1.618	1.696	1.576	2.597	3.209	3.344	3.531	3.631	3.731	3.831	2.667
55	1.622	1.698	1.580	2.600	3.210	3.345	3.532	3.632	3.732	3.832	2.700
56	1.626	1.701	1.584	2.603	3.211	3.346	3.533	3.633	3.733	3.833	2.733
57	1.630	1.704	1.588	2.606	3.212	3.347	3.534	3.634	3.734	3.834	2.766
58	1.634	1.707	1.591	2.609	3.213	3.348	3.535	3.635	3.735	3.835	2.799
59	1.638	1.710	1.595	2.612	3.214	3.349	3.536	3.636	3.736	3.836	2.832
60	1.642	1.713	1.599	2.615	3.215	3.350	3.537	3.637	3.737	3.837	2.865
61	1.646	1.716	1.602	2.618	3.216	3.351	3.538	3.638	3.738	3.838	2.898
62	1.650	1.719	1.606	2.621	3.217	3.352	3.539	3.639	3.739	3.839	2.931
63	1.654	1.722	1.609	2.624	3.218	3.353	3.540	3.640	3.740	3.840	2.964
64	1.658	1.725	1.613	2.627	3.219	3.354	3.541	3.641	3.741	3.841	2.997
65	1.662	1.728	1.616	2.630	3.220	3.355	3.542	3.642	3.742	3.842	3.030
66	1.666	1.731	1.619	2.633	3.221	3.356	3.543	3.643	3.743	3.843	3.063
67	1.670	1.734	1.623	2.636	3.222	3.357	3.544	3.644	3.744	3.844	3.096
68	1.674	1.737	1.626	2.639	3.223	3.358	3.545	3.645	3.745	3.845	3.129
69	1.678	1.740	1.629	2.642	3.224	3.359	3.546	3.646	3.746	3.846	3.162
70	1.682	1.743	1.632	2.645	3.225	3.360	3.547	3.647	3.747	3.847	3.195
71	1.686	1.746	1.635	2.648	3.226	3.361	3.548	3.648	3.748	3.848	3.228
72	1.690	1.749	1.638	2.651	3.227	3.362	3.549	3.649	3.749	3.849	3.261
73	1.694	1.752	1.641	2.654	3.228	3.363	3.550	3.650	3.750	3.850	3.294
74	1.698	1.755	1.644	2.657	3.229	3.364	3.551	3.651	3.751	3.851	3.327
75	1.702	1.758	1.647	2.660	3.230	3.365	3.552	3.652	3.752	3.852	3.360
76	1.706	1.761	1.650	2.663	3.231	3.366	3.553	3.653	3.753	3.853	3.393
77	1.710	1.764	1.653	2.666	3.232	3.367	3.554	3.654	3.754	3.854	3.426
78	1.714	1.767	1.656	2.669	3.233	3.368	3.555	3.655	3.755	3.855	3.459
79	1.718	1.770	1.659	2.672	3.234	3.369	3.556	3.656	3.756	3.856	3.492
80	1.722	1.773	1.662	2.675	3.235	3.370	3.557	3.657	3.757	3.857	3.525
81	1.726	1.776	1.665	2.678	3.236	3.371	3.558	3.658	3.758	3.858	3.558
82	1.730	1.779	1.668	2.681	3.237	3.372	3.559	3.659	3.759	3.859	3.591
83	1.734	1.782	1.671	2.684	3.238	3.373	3.560	3.660	3.760	3.860	3.624
84	1.738	1.785	1.674	2.687	3.239	3.374	3.561	3.661	3.761	3.861	3.657
85	1.742	1.788	1.677	2.690	3.240	3.375	3.562	3.662	3.762	3.862	3.690
86	1.746	1.791	1.680	2.693	3.241	3.376	3.563	3.663	3.763	3.863	3.723
87	1.750	1.794	1.683	2.696	3.242	3.377	3.564	3.664	3.764	3.864	3.756
88	1.754	1.797	1.686	2.699	3.243	3.378	3.565	3.665	3.765	3.865	3.789
89	1.758	1.800	1.689	2.702	3.244	3.379	3.566	3.666	3.766	3.866	3.822
90	1.762	1.803	1.692	2.705	3.245	3.380	3.567	3.667	3.767	3.867	3.855
91	1.766	1.806	1.695	2.708	3.246	3.381	3.568	3.668	3.768	3.868	3.888
92	1.770	1.809	1.698	2.711	3.247	3.382	3.569	3.669	3.769	3.869	3.921
93	1.774	1.812	1.701	2.714	3.248	3.383	3.570	3.670	3.770	3.870	3.954
94	1.778	1.815	1.704	2.717	3.249	3.384	3.571	3.671	3.771	3.871	3.987
95	1.782	1.818	1.707	2.720							

Tabla 10D.2 Cotas críticas $dL_{(\alpha;n,k)}$, $dU_{(\alpha;n,k)}$ del estadístico de Durbin-Watson.

$\alpha = 0.10$	$k = 12$		$k = 13$		$k = 14$		$k = 15$		$k = 16$		$k = 17$		$k = 18$		$k = 19$		$k = 20$		$k = 25$		$k = 30$	
n	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU	dL	dU
17	0.114	3.599																				
18	0.154	3.498	0.102	3.641	0.092	3.677																
19	0.199	3.398	0.139	3.547	0.126	3.589	0.083	3.707														
20	0.245	3.304	0.181	3.453	0.164	3.501	0.114	3.626	0.076	3.734												
21	0.291	3.219	0.223	3.364	0.204	3.417	0.150	3.543	0.104	3.658	0.069	3.757										
22	0.337	3.139	0.266	3.282	0.245	3.338	0.187	3.464	0.138	3.580	0.096	3.686	0.063	3.777	0.058	3.795	0.053	3.811				
23	0.381	3.066	0.310	3.205	0.286	3.264	0.226	3.388	0.173	3.505	0.127	3.613	0.088	3.711	0.081	3.733	0.075	3.752				
24	0.425	2.999	0.352	3.134	0.326	3.066	0.366	3.130	0.303	3.250	0.245	3.365	0.194	3.473	0.180	3.509	0.137	3.604	0.101	3.692		
25	0.467	2.936	0.394	3.068	0.366	3.070	0.406	3.070	0.342	3.187	0.283	3.300	0.229	3.408	0.168	3.542	0.128	3.631				
26	0.507	2.880	0.435	3.006	0.406	3.013	0.444	3.013	0.379	3.127	0.319	3.238	0.264	3.345	0.199	3.482	0.157	3.571				
27	0.546	2.827	0.474	2.949	0.444	2.961	0.481	2.961	0.416	3.072	0.356	3.180	0.299	3.285	0.231	3.423	0.187	3.514	0.037	3.868		
28	0.584	2.779	0.512	2.897	0.481	2.912	0.517	2.912	0.452	3.020	0.391	3.126	0.334	3.229	0.264	3.367	0.217	3.457	0.053	3.824		
29	0.620	2.734	0.549	2.848	0.517	2.866	0.487	2.971	0.426	3.075	0.368	3.175	0.314	3.273	0.264	3.367	0.217	3.457	0.072	3.778		
30	0.654	2.692	0.584	2.802	0.551	2.824	0.521	2.926	0.460	3.026	0.402	3.125	0.347	3.221	0.296	3.314	0.248	3.404	0.072	3.778		
31	0.687	2.654	0.618	2.761	0.584	2.784	0.553	2.883	0.493	2.981	0.435	3.077	0.380	3.171	0.328	3.263	0.279	3.352	0.093	3.731		
32	0.718	2.618	0.650	2.721	0.616	2.748	0.585	2.843	0.525	2.938	0.467	3.032	0.412	3.124	0.359	3.215	0.310	3.302	0.115	3.684		
33	0.748	2.586	0.681	2.685	0.647	2.712	0.615	2.805	0.556	2.898	0.498	2.989	0.443	3.079	0.390	3.168	0.340	3.254	0.138	3.637	0.027	3.902
34	0.776	2.555	0.711	2.651	0.677	2.677	0.645	2.770	0.586	2.860	0.528	2.949	0.473	3.037	0.421	3.124	0.370	3.209	0.163	3.591	0.039	3.869
35	0.804	2.526	0.740	2.619	0.705	2.649	0.673	2.737	0.615	2.824	0.558	2.911	0.503	2.997	0.450	3.082	0.400	3.166	0.188	3.546	0.054	3.833
36	0.830	2.499	0.767	2.589	0.732	2.620	0.700	2.705	0.642	2.791	0.586	2.875	0.532	2.959	0.480	3.043	0.429	3.125	0.213	3.501	0.070	3.796
37	0.855	2.474	0.793	2.561	0.759	2.593	0.726	2.676	0.670	2.759	0.614	2.841	0.560	2.923	0.508	3.005	0.457	3.085	0.239	3.458	0.088	3.758
38	0.879	2.451	0.818	2.535	0.784	2.568	0.751	2.648	0.695	2.729	0.641	2.809	0.587	2.869	0.535	2.968	0.485	3.047	0.265	3.416	0.107	3.719
39	0.902	2.429	0.842	2.511	0.808	2.544	0.776	2.622	0.721	2.700	0.667	2.779	0.614	2.857	0.562	2.935	0.512	3.012	0.290	3.375	0.126	3.681
40	0.924	2.409	0.866	2.488	0.832	2.524	0.799	2.597	0.745	2.673	0.691	2.750	0.639	2.826	0.588	2.902	0.539	2.977	0.316	3.336	0.147	3.643
41	0.945	2.389	0.888	2.466	0.854	2.501	0.821	2.574	0.768	2.648	0.716	2.722	0.664	2.797	0.614	2.871	0.564	2.945	0.341	3.298	0.168	3.605
42	0.965	2.371	0.909	2.446	0.875	2.500	0.843	2.551	0.791	2.624	0.739	2.696	0.688	2.769	0.638	2.842	0.589	2.914	0.367	3.261	0.190	3.568
43	0.985	2.354	0.930	2.426	0.896	2.479	0.864	2.530	0.812	2.601	0.761	2.672	0.711	2.743	0.662	2.814	0.614	2.884	0.391	3.226	0.211	3.531
44	1.003	2.337	0.950	2.408	0.916	2.460	0.884	2.530	0.834	2.579	0.783	2.648	0.734	2.718	0.685	2.787	0.637	2.856	0.416	3.192	0.233	3.496
45	1.021	2.322	0.969	2.391	0.936	2.442	0.904	2.491	0.854	2.558	0.804	2.626	0.756	2.694	0.707	2.761	0.660	2.829	0.440	3.159	0.255	3.460
46	1.039	2.294	1.005	2.359	0.954	2.425	0.922	2.473	0.873	2.539	0.825	2.605	0.777	2.671	0.729	2.737	0.682	2.803	0.463	3.127	0.278	3.426
47	1.055	2.281	1.022	2.345	0.972	2.408	0.941	2.457	0.892	2.520	0.845	2.585	0.797	2.649	0.750	2.714	0.704	2.778	0.486	3.097	0.300	3.393
48	1.071	2.269	1.038	2.331	0.989	2.393	0.941	2.457	0.892	2.520	0.845	2.585	0.797	2.649	0.750	2.714	0.704	2.778	0.486	3.097	0.300	3.393
49	1.087	2.269	1.038	2.331	0.989	2.393	0.941	2.457	0.892	2.520	0.845	2.585	0.797	2.649	0.750	2.714	0.704	2.778	0.486	3.097	0.300	3.393
50	1.102	2.257	1.054	2.317	1.006	2.378	0.958	2.440	0.911	2.502	0.863	2.565	0.817	2.628	0.771	2.691	0.725	2.755	0.509	3.068	0.322	3.361
55	1.169	2.207	1.125	2.261	1.081	2.314	1.037	2.369	0.994	2.425	0.950	2.481	0.907	2.537	0.884	2.594	0.821	2.651	0.615	2.936	0.428	3.211
60	1.225	2.167	1.185	2.215	1.145	2.264	1.105	2.313	1.064	2.363	1.024	2.413	0.984	2.464	0.944	2.515	0.904	2.567	0.709	2.827	0.537	3.083
65	1.274	2.135	1.237	2.179	1.200	2.222	1.163	2.267	1.123	2.312	1.088	2.358	1.050	2.404	1.013	2.450	0.976	2.497	0.792	2.795	0.617	2.973
70	1.316	2.109	1.282	2.148	1.247	2.188	1.213	2.229	1.178	2.270	1.144	2.312	1.109	2.354	1.074	2.397	1.039	2.440	0.866	2.658	0.698	2.879
75	1.353	2.087	1.321	2.123	1.289	2.160	1.257	2.198	1.225	2.235	1.192	2.274	1.160	2.312	1.127	2.351	1.094	2.391	0.931	2.592	0.772	2.798
80	1.385	2.069	1.356	2.102	1.326	2.137	1.296	2.171	1.266	2.206	1.235	2.241	1.205	2.277	1.174	2.313	1.143	2.349	0.990	2.536	0.838	2.727
85	1.414	2.054	1.386	2.085	1.358	2.116	1.330	2.148	1.302	2.180	1.273	2.213	1.245	2.246	1.216	2.253	1.187	2.314	1.042	2.487	0.898	2.666
90	1.440	2.041	1.414	2.069	1.388	2.099	1.361	2.129	1.334	2.159	1.307	2.189	1.281	2.220	1.253	2.252	1.226	2.283	1.089	2.445	0.952	2.612
95	1.463	2.029	1.438	2.056	1.414	2.084	1.389	2.112	1.363	2.140	1.338	2.168	1.313	2.197	1.287	2.227	1.261	2.293	1.131	2.408	1.001	2.564
100	1.484	2.019	1.461	2.045	1.438	2.071	1.414	2.045	1.390	2.123	1.366	2.150	1.342	2.177	1.318	2.205	1.293	2.332	1.170	2.375	1.046	2.522
125	1.566	1.986	1.547	2.005	1.529	2.025	1.510	2.045	1.492	2.065	1.473	2.086	1.454	2.106	1.435	2.127	1.415	2.148	1.318	2.257	1.219	2.369
150	1.621	1.967	1.606	1.982	1.591	1.998	1.576	2.014	1.561	2.031	1.545	2.047	1.530	2.064	1.514	2.081	1.498	2.098	1.418	2.184	1.337	2.275
175	1.662	1.955	1.649	1.968	1.637	1.982	1.624	1.995	1.611	2.009	1.598	2.022	1.585	2.036	1.571	2.050	1.558	2.064	1.490	2.137	1.421	2.211
200	1.693	1.948	1.682	1.959	1.671	1.971	1.660	1.982	1.649	1.994	1.637	2.005	1.626	2.018	1.615	2.029	1.603	2.041	1.545	2.103	1.485	2.167

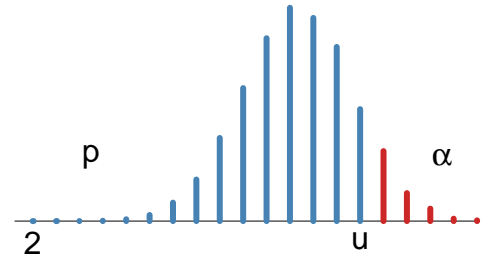


11. Distribución del estadístico U de Corridas (Wald-Wolfowitz)

U = número de corridas.

$$P(U = u) = \begin{cases} 2 \binom{m-1}{k-1} \binom{n-1}{k-1} / \binom{m+n}{m} & \text{si } u = 2k \\ \left(\binom{m-1}{k-1} \binom{n-1}{k-2} + \binom{m-1}{k-2} \binom{n-1}{k-1} \right) / \binom{m+n}{m} & \text{si } u = 2k - 1 \end{cases}$$

donde m y n son el total de ceros y unos en la secuencia, respectivamente.



$$p = P(U \leq u) = \sum_{k=1}^u P(U = k) = 1 - \alpha$$

Tabla 11A. Probabilidades acumuladas p de la distribución de corridas.

(m, n)	2	3	4	5	6	7	8	9	10	11
(2, 2)	0.333	0.667	1.000	.	.	.	.	.	.	.
(2, 3)	0.200	0.500	0.900	1.000	.	.	.	.	.	.
(2, 4)	0.133	0.400	0.800	1.000	.	.	.	.	.	.
(2, 5)	0.095	0.333	0.714	1.000	.	.	.	.	.	.
(2, 6)	0.071	0.286	0.643	1.000	.	.	.	.	.	.
(2, 7)	0.056	0.250	0.583	1.000	.	.	.	.	.	.
(2, 8)	0.044	0.222	0.533	1.000	.	.	.	.	.	.
(2, 9)	0.036	0.200	0.491	1.000	.	.	.	.	.	.
(2, 10)	0.030	0.182	0.455	1.000	.	.	.	.	.	.
(2, 11)	0.026	0.167	0.423	1.000	.	.	.	.	.	.
(2, 12)	0.022	0.154	0.396	1.000	.	.	.	.	.	.
(2, 13)	0.019	0.143	0.371	1.000	.	.	.	.	.	.
(2, 14)	0.017	0.133	0.350	1.000	.	.	.	.	.	.
(2, 15)	0.015	0.125	0.331	1.000	.	.	.	.	.	.
(2, 16)	0.013	0.118	0.314	1.000	.	.	.	.	.	.
(2, 17)	0.012	0.111	0.298	1.000	.	.	.	.	.	.
(2, 18)	0.011	0.105	0.284	1.000	.	.	.	.	.	.
(2, 19)	0.010	0.100	0.271	1.000	.	.	.	.	.	.
(3, 2)	0.009	0.095	0.260	1.000	.	.	.	.	.	.
(3, 3)	0.100	0.300	0.700	0.900	1.000	.	.	.	.	.
(3, 4)	0.057	0.200	0.543	0.800	0.971	1.000	.	.	.	.
(3, 5)	0.036	0.143	0.429	0.714	0.929	1.000	.	.	.	.
(3, 6)	0.024	0.107	0.345	0.643	0.881	1.000	.	.	.	.
(3, 7)	0.017	0.083	0.283	0.583	0.833	1.000	.	.	.	.
(3, 8)	0.012	0.067	0.236	0.533	0.788	1.000	.	.	.	.
(3, 9)	0.009	0.055	0.200	0.491	0.745	1.000	.	.	.	.
(3, 10)	0.007	0.045	0.171	0.455	0.706	1.000	.	.	.	.
(3, 11)	0.005	0.038	0.148	0.423	0.670	1.000	.	.	.	.
(3, 12)	0.004	0.033	0.130	0.396	0.637	1.000	.	.	.	.
(3, 13)	0.004	0.029	0.114	0.371	0.607	1.000	.	.	.	.
(3, 14)	0.003	0.025	0.101	0.350	0.579	1.000	.	.	.	.
(3, 15)	0.002	0.022	0.091	0.331	0.554	1.000	.	.	.	.
(3, 16)	0.002	0.020	0.082	0.314	0.530	1.000	.	.	.	.
(3, 17)	0.002	0.018	0.074	0.298	0.509	1.000	.	.	.	.
(3, 18)	0.002	0.016	0.067	0.284	0.489	1.000	.	.	.	.
(3, 19)	0.001	0.014	0.061	0.271	0.470	1.000	.	.	.	.
(3, 20)	0.001	0.013	0.056	0.260	0.453	1.000	.	.	.	.
(4, 4)	0.029	0.114	0.371	0.629	0.886	0.971	1.000	.	.	.
(4, 5)	0.016	0.071	0.262	0.500	0.786	0.929	0.992	1.000	.	.
(4, 6)	0.010	0.048	0.190	0.405	0.690	0.881	0.976	1.000	.	.
(4, 7)	0.006	0.033	0.142	0.333	0.606	0.833	0.955	1.000	.	.
(4, 8)	0.004	0.024	0.109	0.279	0.533	0.788	0.929	1.000	.	.
(4, 9)	0.003	0.018	0.085	0.236	0.471	0.745	0.902	1.000	.	.
(4, 10)	0.002	0.014	0.068	0.203	0.419	0.706	0.874	1.000	.	.
(4, 11)	0.001	0.011	0.055	0.176	0.374	0.670	0.846	1.000	.	.
(4, 12)	0.001	0.009	0.045	0.154	0.335	0.637	0.819	1.000	.	.
(4, 13)	0.001	0.007	0.037	0.136	0.302	0.607	0.792	1.000	.	.
(4, 14)	0.001	0.006	0.031	0.121	0.274	0.579	0.766	1.000	.	.
(4, 15)	0.001	0.005	0.027	0.108	0.249	0.554	0.742	1.000	.	.
(4, 16)	0.000	0.004	0.023	0.097	0.227	0.530	0.718	1.000	.	.
(4, 17)	0.000	0.004	0.020	0.088	0.208	0.509	0.696	1.000	.	.
(4, 18)	0.000	0.003	0.017	0.080	0.191	0.489	0.675	1.000	.	.
(4, 19)	0.000	0.003	0.015	0.073	0.176	0.470	0.654	1.000	.	.
(4, 20)	0.000	0.002	0.013	0.067	0.163	0.453	0.635	1.000	.	.
(5, 5)	0.008	0.040	0.167	0.357	0.643	0.833	0.960	0.992	1.000	.
(5, 6)	0.004	0.024	0.110	0.262	0.522	0.738	0.911	0.976	0.998	1.000
(5, 7)	0.003	0.015	0.076	0.197	0.424	0.652	0.854	0.955	0.992	1.000
(5, 8)	0.002	0.010	0.054	0.152	0.347	0.576	0.793	0.929	0.984	1.000
(5, 9)	0.001	0.007	0.039	0.119	0.287	0.510	0.734	0.902	0.972	1.000
(5, 10)	0.001	0.005	0.029	0.095	0.239	0.455	0.678	0.874	0.958	1.000
(5, 11)	0.000	0.004	0.022	0.077	0.201	0.407	0.626	0.846	0.942	1.000
(5, 12)	0.000	0.003	0.017	0.063	0.170	0.365	0.579	0.819	0.925	1.000
(5, 13)	0.000	0.002	0.013	0.053	0.145	0.330	0.535	0.792	0.908	1.000
(5, 14)	0.000	0.002	0.011	0.044	0.125	0.299	0.496	0.766	0.889	1.000
(5, 15)	0.000	0.001	0.009	0.037	0.108	0.272	0.460	0.742	0.871	1.000
(5, 16)	0.000	0.001	0.007	0.032	0.094	0.249	0.428	0.718	0.852	1.000
(5, 17)	0.000	0.001	0.006	0.028	0.082	0.228	0.398	0.696	0.834	1.000
(5, 18)	0.000	0.001	0.005	0.024	0.072	0.210	0.372	0.675	0.816	1.000
(5, 19)	0.000	0.001	0.004	0.021	0.064	0.194	0.347	0.654	0.798	1.000
(5, 20)	0.000	0.000	0.003	0.018	0.057	0.179	0.325	0.635	0.781	1.000

Tabla 11B. Probabilidades acumuladas p de la distribución de corridas.

(m, n)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
(6, 6)	0.002	0.013	0.067	0.175	0.392	0.608	0.825	0.933	0.987	0.998	1.000	-	-	-	-	-	-	-	-	-
(6, 7)	0.001	0.008	0.043	0.121	0.296	0.500	0.733	0.879	0.966	0.992	0.998	1.000	-	-	-	-	-	-	-	-
(6, 8)	0.001	0.005	0.028	0.086	0.226	0.413	0.646	0.821	0.937	0.984	0.998	1.000	-	-	-	-	-	-	-	-
(6, 9)	0.000	0.003	0.019	0.063	0.175	0.343	0.566	0.762	0.902	0.972	0.994	1.000	-	-	-	-	-	-	-	-
(6, 10)	0.000	0.002	0.013	0.047	0.137	0.287	0.497	0.706	0.864	0.958	0.990	1.000	-	-	-	-	-	-	-	-
(6, 11)	0.000	0.001	0.009	0.036	0.108	0.242	0.436	0.654	0.824	0.942	0.983	1.000	-	-	-	-	-	-	-	-
(6, 12)	0.000	0.001	0.007	0.028	0.087	0.205	0.383	0.605	0.783	0.925	0.975	1.000	-	-	-	-	-	-	-	-
(6, 13)	0.000	0.001	0.005	0.022	0.070	0.176	0.338	0.561	0.743	0.908	0.966	1.000	-	-	-	-	-	-	-	-
(6, 14)	0.000	0.001	0.004	0.017	0.058	0.151	0.299	0.520	0.705	0.889	0.956	1.000	-	-	-	-	-	-	-	-
(6, 15)	0.000	0.000	0.003	0.014	0.047	0.131	0.265	0.483	0.668	0.871	0.945	1.000	-	-	-	-	-	-	-	-
(6, 16)	0.000	0.000	0.002	0.011	0.039	0.115	0.237	0.450	0.633	0.852	0.933	1.000	-	-	-	-	-	-	-	-
(6, 17)	0.000	0.000	0.002	0.009	0.033	0.100	0.211	0.419	0.600	0.834	0.921	1.000	-	-	-	-	-	-	-	-
(6, 18)	0.000	0.000	0.001	0.008	0.028	0.089	0.190	0.392	0.569	0.816	0.908	1.000	-	-	-	-	-	-	-	-
(6, 19)	0.000	0.000	0.001	0.006	0.024	0.078	0.171	0.366	0.539	0.798	0.895	1.000	-	-	-	-	-	-	-	-
(6, 20)	0.000	0.000	0.001	0.005	0.020	0.070	0.154	0.343	0.512	0.781	0.882	1.000	-	-	-	-	-	-	-	-
(7, 7)	0.001	0.004	0.025	0.078	0.209	0.383	0.617	0.791	0.922	0.975	0.996	0.999	1.000	-	-	-	-	-	-	-
(7, 8)	0.000	0.002	0.015	0.051	0.149	0.296	0.514	0.704	0.867	0.949	0.988	0.998	1.000	-	-	-	-	-	-	-
(7, 9)	0.000	0.001	0.010	0.035	0.108	0.231	0.427	0.622	0.806	0.916	0.975	0.994	0.999	1.000	-	-	-	-	-	-
(7, 10)	0.000	0.001	0.006	0.024	0.080	0.182	0.355	0.549	0.743	0.879	0.957	0.990	0.998	1.000	-	-	-	-	-	-
(7, 11)	0.000	0.001	0.004	0.018	0.060	0.145	0.296	0.484	0.682	0.840	0.936	0.983	0.996	1.000	-	-	-	-	-	-
(7, 12)	0.000	0.000	0.003	0.013	0.046	0.117	0.247	0.428	0.624	0.801	0.911	0.975	0.993	1.000	-	-	-	-	-	-
(7, 13)	0.000	0.000	0.002	0.010	0.035	0.095	0.208	0.378	0.570	0.762	0.884	0.966	0.990	1.000	-	-	-	-	-	-
(7, 14)	0.000	0.000	0.002	0.007	0.027	0.078	0.176	0.336	0.520	0.723	0.856	0.956	0.985	1.000	-	-	-	-	-	-
(7, 15)	0.000	0.000	0.001	0.006	0.022	0.064	0.150	0.299	0.475	0.686	0.827	0.945	0.980	1.000	-	-	-	-	-	-
(7, 16)	0.000	0.000	0.001	0.004	0.017	0.054	0.128	0.267	0.434	0.651	0.798	0.933	0.974	1.000	-	-	-	-	-	-
(7, 17)	0.000	0.000	0.001	0.003	0.014	0.045	0.110	0.239	0.397	0.618	0.769	0.921	0.967	1.000	-	-	-	-	-	-
(7, 18)	0.000	0.000	0.000	0.003	0.011	0.038	0.095	0.215	0.363	0.586	0.741	0.908	0.960	1.000	-	-	-	-	-	-
(7, 19)	0.000	0.000	0.000	0.002	0.009	0.032	0.082	0.194	0.333	0.557	0.713	0.895	0.952	1.000	-	-	-	-	-	-
(7, 20)	0.000	0.000	0.000	0.002	0.008	0.028	0.071	0.175	0.306	0.529	0.686	0.882	0.943	1.000	-	-	-	-	-	-
(8, 8)	0.000	0.001	0.009	0.032	0.100	0.214	0.405	0.595	0.786	0.900	0.968	0.991	0.999	1.000	-	-	-	-	-	-
(8, 9)	0.000	0.001	0.005	0.020	0.069	0.157	0.319	0.500	0.702	0.843	0.939	0.980	0.996	0.999	1.000	-	-	-	-	-
(8, 10)	0.000	0.000	0.003	0.013	0.048	0.117	0.251	0.419	0.621	0.782	0.903	0.964	0.990	0.998	1.000	-	-	-	-	-
(8, 11)	0.000	0.000	0.002	0.009	0.034	0.088	0.199	0.352	0.547	0.722	0.862	0.943	0.982	0.996	0.999	1.000	-	-	-	-
(8, 12)	0.000	0.000	0.001	0.006	0.025	0.067	0.158	0.297	0.480	0.663	0.817	0.920	0.971	0.993	0.999	1.000	-	-	-	-
(8, 13)	0.000	0.000	0.001	0.004	0.018	0.052	0.129	0.251	0.421	0.608	0.772	0.894	0.958	0.990	0.998	1.000	-	-	-	-
(8, 14)	0.000	0.000	0.001	0.003	0.013	0.041	0.103	0.213	0.369	0.557	0.726	0.867	0.942	0.985	0.996	1.000	-	-	-	-
(8, 15)	0.000	0.000	0.000	0.002	0.010	0.032	0.084	0.182	0.325	0.510	0.682	0.839	0.925	0.980	0.994	1.000	-	-	-	-
(8, 16)	0.000	0.000	0.000	0.002	0.008	0.026	0.069	0.156	0.286	0.467	0.639	0.810	0.906	0.974	0.991	1.000	-	-	-	-
(8, 17)	0.000	0.000	0.000	0.001	0.006	0.021	0.057	0.134	0.252	0.428	0.598	0.782	0.886	0.967	0.988	1.000	-	-	-	-
(8, 18)	0.000	0.000	0.000	0.001	0.005	0.017	0.047	0.116	0.223	0.393	0.559	0.754	0.864	0.960	0.984	1.000	-	-	-	-
(8, 19)	0.000	0.000	0.000	0.001	0.004	0.014	0.040	0.101	0.197	0.361	0.523	0.726	0.843	0.952	0.980	1.000	-	-	-	-
(8, 20)	0.000	0.000	0.000	0.001	0.003	0.011	0.033	0.088	0.175	0.332	0.489	0.699	0.821	0.943	0.976	1.000	-	-	-	-
(9, 9)	0.000	0.000	0.003	0.012	0.044	0.109	0.238	0.399	0.601	0.762	0.891	0.956	0.988	0.997	0.999	0.999	1.000	-	-	-
(9, 10)	0.000	0.000	0.002	0.008	0.029	0.077	0.179	0.319	0.510	0.681	0.834	0.923	0.974	0.992	0.999	0.999	1.000	-	-	-
(9, 11)	0.000	0.000	0.001	0.005	0.020	0.055	0.135	0.255	0.430	0.605	0.773	0.885	0.955	0.985	0.997	0.999	1.000	-	-	-
(9, 12)	0.000	0.000	0.001	0.003	0.014	0.040	0.103	0.205	0.362	0.535	0.711	0.843	0.931	0.975	0.993	0.999	1.000	-	-	-
(9, 13)	0.000	0.000	0.000	0.002	0.010	0.029	0.079	0.166	0.305	0.472	0.650	0.799	0.903	0.963	0.988	0.998	0.999	1.000	-	-
(9, 14)	0.000	0.000	0.000	0.001	0.007	0.022	0.061	0.135	0.257	0.416	0.593	0.754	0.872	0.948	0.981	0.996	0.999	1.000	-	-
(9, 15)	0.000	0.000	0.000	0.001	0.005	0.017	0.048	0.110	0.217	0.367	0.539	0.710	0.839	0.931	0.973	0.994	0.998	1.000	-	-
(9, 16)	0.000	0.000	0.000	0.001	0.004	0.013	0.038	0.091	0.184	0.325	0.489	0.668	0.805	0.913	0.963	0.991	0.998	1.000	-	-
(9, 17)	0.000	0.000	0.000	0.001	0.003	0.010	0.030	0.075	0.157	0.287	0.444	0.626	0.770	0.893	0.951	0.988	0.996	1.000	-	-
(9, 18)	0.000	0.000	0.000	0.000	0.002	0.008	0.024	0.063	0.134	0.255	0.402	0.587	0.735	0.872	0.939	0.984	0.995	1.000	-	-
(9, 19)	0.000	0.000	0.000	0.000	0.002	0.006	0.019	0.052	0.114	0.226	0.365	0.550	0.701	0.851	0.925	0.980	0.993	1.000	-	-
(9, 20)	0.000	0.000	0.000	0.000	0.001	0.005	0.016	0.044	0.098	0.201	0.331	0.516	0.667	0.830	0.910	0.976	0.991	1.000	-	-
(10, 10)	0.000	0.000	0.001	0.004	0.019	0.051	0.128	0.242	0.414	0.586	0.758	0.872	0.949	0.981	0.996	0.999	0.999	1.000	-	-
(10, 11)	0.000	0.000	0.001	0.003	0.012	0.035	0.092	0.185	0.335	0.500	0.680	0.815	0.915	0.965	0.990	0.999	0.999	1.000	-	-
(10, 12)	0.000	0.000	0.000	0.002	0.008	0.024	0.067	0.142	0.271	0.425	0.605	0.755	0.875	0.944	0.980	0.999	0.999	1.000	-	-
(10, 13)	0.000	0.000	0.000	0.001	0.005	0.017	0.049	0.110	0.219	0.361	0.535	0.695	0.831	0.918	0.968	0.990	0.999	0.999	1.000	-
(10, 14)	0.000	0.000	0.000	0.001	0.004	0.012	0.037	0.086	0.178	0.306	0.472	0.637	0.784	0.889	0.952	0.983	0.999	0.999	1.000	-
(10, 15)	0.000	0.000	0.000	0.000	0.003	0.009	0.028	0.067	0.144	0.260	0.415	0.582	0.736	0.857	0.933	0.976	0.998	0.999	1.000	-
(10, 16)	0.000	0.000	0.000	0.000	0.002	0.007	0.021	0.053	0.118	0.222	0.364	0.530	0.689	0.824	0.912	0.966	0.988	0.998	0.999	1.000
(10, 17)	0.000	0.000	0.000	0.000	0.001	0.005	0.016	0.042	0.097	0.189	0.320	0.483	0.642	0.790	0.888	0.955	0.983	0.996	0.999	1.000
(10, 18)	0.000	0.000	0.000	0.000	0.001	0.004	0.012	0.034	0.080	0.162	0.281	0.439	0.598	0.756	0.8					

Tabla 11C.1 Probabilidades acumuladas p de la distribución de corridas.

(m, n)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
(11, 11)	0.000	0.000	0.000	0.002	0.007	0.023	0.063	0.135	0.260	0.410	0.590	0.740	0.865	0.937	0.977	0.993	0.998	0.999	0.999	0.999
(11, 12)	0.000	0.000	0.000	0.001	0.005	0.015	0.044	0.099	0.202	0.335	0.507	0.665	0.809	0.901	0.959	0.985	0.996	0.999	0.999	0.999
(11, 13)	0.000	0.000	0.000	0.001	0.003	0.010	0.031	0.074	0.157	0.273	0.433	0.593	0.749	0.860	0.936	0.974	0.992	0.998	0.999	0.999
(11, 14)	0.000	0.000	0.000	0.000	0.000	0.002	0.007	0.022	0.055	0.122	0.223	0.369	0.528	0.688	0.815	0.908	0.960	0.996	0.999	0.999
(11, 15)	0.000	0.000	0.000	0.000	0.000	0.001	0.016	0.042	0.096	0.183	0.314	0.466	0.629	0.769	0.876	0.942	0.977	0.993	0.998	0.999
(11, 16)	0.000	0.000	0.000	0.000	0.000	0.001	0.012	0.032	0.076	0.150	0.266	0.412	0.573	0.723	0.841	0.922	0.967	0.989	0.997	0.999
(11, 17)	0.000	0.000	0.000	0.000	0.000	0.001	0.009	0.024	0.060	0.124	0.227	0.363	0.520	0.676	0.804	0.900	0.954	0.984	0.995	0.999
(11, 18)	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.019	0.048	0.103	0.193	0.321	0.471	0.632	0.767	0.876	0.939	0.978	0.992	0.999
(11, 19)	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.015	0.038	0.085	0.164	0.283	0.426	0.589	0.729	0.851	0.923	0.971	0.989	0.998
(11, 20)	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.012	0.031	0.071	0.140	0.250	0.385	0.548	0.691	0.825	0.905	0.963	0.985	0.997
(12, 12)	0.000	0.000	0.000	0.001	0.003	0.009	0.030	0.070	0.150	0.263	0.421	0.579	0.737	0.850	0.930	0.970	0.991	0.997	0.999	0.999
(12, 13)	0.000	0.000	0.000	0.000	0.002	0.006	0.020	0.050	0.113	0.207	0.348	0.500	0.664	0.793	0.894	0.950	0.982	0.994	0.999	0.999
(12, 14)	0.000	0.000	0.000	0.000	0.001	0.004	0.014	0.036	0.085	0.163	0.286	0.430	0.594	0.735	0.852	0.925	0.969	0.989	0.997	0.999
(12, 15)	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.010	0.026	0.064	0.129	0.236	0.368	0.528	0.676	0.806	0.933	0.981	0.994	0.998
(12, 16)	0.000	0.000	0.000	0.000	0.000	0.002	0.007	0.019	0.049	0.102	0.193	0.315	0.467	0.619	0.759	0.863	0.933	0.972	0.990	0.997
(12, 17)	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.014	0.037	0.081	0.159	0.269	0.412	0.565	0.710	0.828	0.910	0.960	0.984	0.995
(12, 18)	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.011	0.029	0.065	0.131	0.230	0.363	0.514	0.662	0.792	0.885	0.947	0.977	0.993
(12, 19)	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.008	0.022	0.052	0.108	0.197	0.319	0.466	0.615	0.755	0.857	0.931	0.969	0.990
(12, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.017	0.042	0.090	0.169	0.280	0.423	0.570	0.718	0.828	0.914	0.959	0.986
(13, 13)	0.000	0.000	0.000	0.000	0.001	0.004	0.013	0.034	0.081	0.157	0.277	0.418	0.582	0.723	0.843	0.919	0.966	0.987	0.996	0.999
(13, 14)	0.000	0.000	0.000	0.000	0.001	0.002	0.009	0.024	0.059	0.119	0.221	0.348	0.506	0.652	0.788	0.881	0.945	0.976	0.992	0.998
(13, 15)	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.017	0.043	0.091	0.175	0.288	0.436	0.585	0.730	0.839	0.918	0.962	0.986	0.995
(13, 16)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.012	0.029	0.069	0.140	0.239	0.375	0.521	0.671	0.793	0.887	0.945	0.977
(13, 17)	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.008	0.023	0.054	0.111	0.198	0.322	0.463	0.614	0.746	0.853	0.924	0.966	0.981
(13, 18)	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.006	0.018	0.042	0.089	0.164	0.275	0.410	0.559	0.699	0.816	0.900	0.952	0.981
(13, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.013	0.032	0.071	0.137	0.235	0.362	0.507	0.653	0.777	0.874	0.936	0.973
(13, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.010	0.025	0.058	0.114	0.201	0.320	0.459	0.607	0.738	0.847	0.917	0.964
(14, 14)	0.000	0.000	0.000	0.000	0.000	0.001	0.006	0.016	0.041	0.087	0.170	0.280	0.427	0.573	0.720	0.830	0.913	0.959	0.984	0.994
(14, 15)	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.011	0.029	0.064	0.131	0.225	0.358	0.500	0.652	0.775	0.875	0.936	0.973	0.989
(14, 16)	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.007	0.021	0.048	0.101	0.180	0.299	0.434	0.585	0.718	0.832	0.908	0.957	0.982
(14, 17)	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.015	0.035	0.078	0.145	0.249	0.374	0.523	0.661	0.786	0.938	0.972	0.982
(14, 18)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.011	0.027	0.060	0.117	0.207	0.323	0.464	0.606	0.739	0.842	0.916	0.960
(14, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.008	0.020	0.047	0.094	0.172	0.278	0.411	0.553	0.690	0.805	0.890	0.945
(14, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.006	0.015	0.037	0.076	0.143	0.239	0.363	0.503	0.642	0.767	0.862	0.928
(15, 15)	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.007	0.020	0.046	0.097	0.175	0.291	0.424	0.576	0.709	0.825	0.903	0.954	0.980
(15, 16)	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.014	0.033	0.073	0.136	0.236	0.366	0.505	0.642	0.775	0.875	0.931	0.967	0.987
(15, 17)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.010	0.024	0.055	0.106	0.191	0.300	0.439	0.578	0.715	0.821	0.902	0.951
(15, 18)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.007	0.017	0.041	0.083	0.155	0.252	0.381	0.517	0.658	0.775	0.869	0.930
(15, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.005	0.013	0.031	0.065	0.125	0.211	0.329	0.461	0.603	0.729	0.833	0.907
(15, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.009	0.024	0.051	0.101	0.177	0.283	0.410	0.549	0.681	0.795	0.881
(16, 16)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.009	0.023	0.053	0.103	0.186	0.293	0.431	0.569	0.707	0.814	0.897	0.947
(16, 17)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.006	0.016	0.038	0.078	0.147	0.246	0.366	0.500	0.642	0.760	0.858	0.922
(16, 18)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.011	0.028	0.059	0.115	0.196	0.309	0.437	0.570	0.705	0.815	0.893
(16, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.008	0.021	0.045	0.091	0.159	0.260	0.380	0.519	0.650	0.770	0.860
(16, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.006	0.015	0.034	0.072	0.130	0.219	0.330	0.463	0.596	0.722	0.824
(17, 17)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.011	0.027	0.057	0.112	0.191	0.303	0.429	0.571	0.697	0.809	0.888
(17, 18)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.007	0.019	0.042	0.086	0.151	0.249	0.366	0.504	0.634	0.757	0.849
(17, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.005	0.014	0.031	0.066	0.120	0.205	0.311	0.442	0.573	0.702	0.806
(17, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.010	0.023	0.051	0.096	0.168	0.263	0.385	0.515	0.647	0.760
(18, 18)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.005	0.013	0.030	0.064	0.117	0.200	0.305	0.435	0.565	0.695	0.800
(18, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.009	0.022	0.048	0.091	0.161	0.253	0.373	0.500	0.634	0.747
(18, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.007	0.016	0.036	0.070	0.129	0.209	0.318	0.440	0.574	0.694
(19, 19)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.002	0.006	0.015	0.035	0.068	0.126	0.204	0.313	0.433	0.567	0.687
(19, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.004	0.011	0.025	0.052	0.098	0.165	0.261	0.373	0.503	0.627
(20, 20)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.007	0.018	0.038	0.075	0.130	0.213	0.314	0.438	0.562

Tabla 11C.2 Probabilidades acumuladas p de la distribución de corridas.

(m, n)	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
(11, 11)	1.000																			
(11, 12)	0.999	1.000																		
(11, 13)	0.999	1.000																		
(11, 14)	0.999	1.000																		
(11, 15)	0.999	1.000																		
(11, 16)	0.999	1.000																		
(11, 17)	0.999	1.000																		
(11, 18)	0.999	1.000																		
(11, 19)	0.999	1.000																		
(11, 20)	0.999	1.000																		
(12, 12)	0.999	0.999	1.000																	
(12, 13)	0.999	0.999	0.999	1.000																
(12, 14)	0.999	0.999	0.999	0.999	1.000															
(12, 15)	0.999	0.999	0.999	0.999	0.999	1.000														
(12, 16)	0.999	0.999	0.999	0.999	0.999	0.999	1.000													
(12, 17)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000												
(12, 18)	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000											
(12, 19)	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000										
(12, 20)	0.995	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000									
(13, 13)	0.999	0.999	0.999	0.999	0.999	1.000														
(13, 14)	0.999	0.999	0.999	0.999	0.999	0.999	1.000													
(13, 15)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000												
(13, 16)	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000											
(13, 17)	0.996	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000										
(13, 18)	0.993	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000									
(13, 19)	0.989	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000								
(13, 20)	0.985	0.995	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000							
(14, 14)	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000												
(14, 15)	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000									
(14, 16)	0.994	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000								
(14, 17)	0.989	0.996	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000							
(14, 18)	0.983	0.994	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000						
(14, 19)	0.976	0.991	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000					
(14, 20)	0.966	0.987	0.995	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	1.000				
(15, 15)	0.993	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(15, 16)	0.987	0.995	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(15, 17)	0.979	0.992	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(15, 18)	0.968	0.987	0.995	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(15, 19)	0.954	0.980	0.992	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(15, 20)	0.938	0.971	0.988	0.996	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(16, 16)	0.977	0.991	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(16, 17)	0.963	0.984	0.994	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(16, 18)	0.946	0.975	0.990	0.996	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(16, 19)	0.924	0.963	0.984	0.994	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(16, 20)	0.900	0.948	0.976	0.990	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(17, 17)	0.943	0.973	0.989	0.996	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(17, 18)	0.917	0.958	0.982	0.993	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(17, 19)	0.887	0.959	0.971	0.988	0.995	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(17, 20)	0.853	0.917	0.958	0.981	0.992	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(18, 18)	0.883	0.936	0.970	0.987	0.995	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(18, 19)	0.844	0.909	0.954	0.978	0.991	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(18, 20)	0.801	0.879	0.935	0.967	0.986	0.994	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(19, 19)	0.796	0.874	0.932	0.965	0.985	0.994	0.998	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(19, 20)	0.744	0.835	0.905	0.948	0.976	0.996	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
(20, 20)	0.686	0.787	0.870	0.925	0.962	0.982	0.993	0.997	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999

12. Distribución del estadístico ρ_s de Spearman

$$\rho_s = 1 - \frac{6 \sum d_i^2}{n^3 - n}$$

donde d_i es la diferencia de rangos para el individuo i .

Notas:

- $-1 \leq \rho_s \leq 1$.
- La distribución de ρ_s es simétrica, luego $P(\rho_s \geq r_s) = P(\rho_s \leq -r_s)$.

$$p = P(\rho_s \leq r) = \sum_k P(\rho_s = k) = 1 - \alpha$$

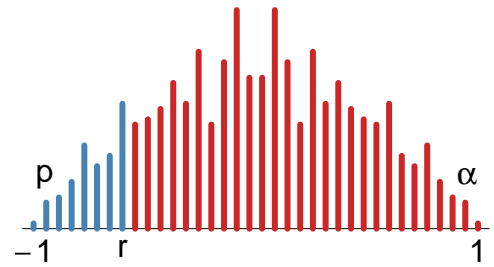


Tabla 12. Valores críticos $r_{(\alpha;n)}$ de la distribución ρ_s de Spearman*.

n	p				n	p			
	0.99	0.975	0.95	0.90		0.99	0.975	0.95	0.90
	α					α			
	0.01	0.025	0.05	0.10		0.01	0.025	0.05	0.10
5	1.000	1.000	0.900	0.800	53	0.320	0.271	0.228	0.179
6	0.943	0.886	0.829	0.657	54	0.317	0.268	0.226	0.177
7	0.893	0.786	0.714	0.571	55	0.314	0.266	0.224	0.175
8	0.833	0.738	0.643	0.524	56	0.311	0.264	0.222	0.174
9	0.783	0.700	0.600	0.483	57	0.308	0.261	0.220	0.172
10	0.745	0.648	0.564	0.455	58	0.306	0.259	0.218	0.171
11	0.709	0.618	0.536	0.427	59	0.303	0.257	0.216	0.169
12	0.678	0.587	0.503	0.406	60	0.301	0.254	0.214	0.168
13	0.648	0.560	0.484	0.385	61	0.298	0.252	0.213	0.166
14	0.626	0.538	0.464	0.367	62	0.296	0.250	0.211	0.165
15	0.604	0.521	0.446	0.354	63	0.293	0.248	0.209	0.163
16	0.582	0.503	0.429	0.341	64	0.291	0.246	0.207	0.162
17	0.566	0.488	0.414	0.328	65	0.289	0.244	0.206	0.161
18	0.550	0.472	0.401	0.317	66	0.287	0.243	0.204	0.160
19	0.535	0.458	0.390	0.307	67	0.284	0.241	0.203	0.158
20	0.521	0.446	0.379	0.299	68	0.282	0.239	0.201	0.157
21	0.508	0.435	0.369	0.291	69	0.280	0.237	0.200	0.156
22	0.497	0.425	0.360	0.284	70	0.278	0.235	0.198	0.155
23	0.486	0.415	0.352	0.277	71	0.276	0.234	0.197	0.154
24	0.475	0.406	0.344	0.271	72	0.274	0.232	0.195	0.153
25	0.466	0.398	0.337	0.265	73	0.272	0.230	0.194	0.152
26	0.457	0.390	0.330	0.259	74	0.271	0.229	0.193	0.151
27	0.448	0.382	0.324	0.254	75	0.269	0.227	0.191	0.150
28	0.440	0.375	0.317	0.249	76	0.267	0.226	0.190	0.149
29	0.432	0.368	0.312	0.245	77	0.265	0.224	0.189	0.148
30	0.425	0.362	0.306	0.240	78	0.264	0.223	0.188	0.147
31	0.418	0.356	0.301	0.236	79	0.262	0.221	0.186	0.146
32	0.412	0.350	0.296	0.232	80	0.260	0.220	0.185	0.145
33	0.405	0.345	0.291	0.229	81	0.259	0.219	0.184	0.144
34	0.399	0.340	0.287	0.225	82	0.257	0.217	0.183	0.143
35	0.394	0.335	0.283	0.222	83	0.255	0.216	0.182	0.142
36	0.388	0.330	0.279	0.218	84	0.254	0.215	0.181	0.141
37	0.383	0.325	0.275	0.215	85	0.252	0.213	0.180	0.140
38	0.378	0.321	0.271	0.212	86	0.251	0.212	0.179	0.139
39	0.373	0.317	0.267	0.209	87	0.250	0.211	0.177	0.139
40	0.368	0.313	0.264	0.207	88	0.248	0.210	0.176	0.138
41	0.364	0.309	0.261	0.204	89	0.247	0.209	0.175	0.137
42	0.359	0.305	0.257	0.201	90	0.245	0.207	0.174	0.136
43	0.355	0.301	0.254	0.199	91	0.244	0.206	0.173	0.135
44	0.351	0.298	0.251	0.197	92	0.243	0.205	0.173	0.135
45	0.347	0.294	0.248	0.194	93	0.241	0.204	0.172	0.134
46	0.343	0.291	0.246	0.192	94	0.240	0.203	0.171	0.133
47	0.340	0.288	0.243	0.190	95	0.239	0.202	0.170	0.133
48	0.336	0.285	0.240	0.188	96	0.238	0.201	0.169	0.132
49	0.333	0.282	0.238	0.186	97	0.236	0.200	0.168	0.131
50	0.329	0.279	0.235	0.184	98	0.235	0.199	0.167	0.130
51	0.326	0.276	0.233	0.182	99	0.234	0.198	0.166	0.130
52	0.323	0.274	0.231	0.180	100	0.233	0.197	0.165	0.129

*Para $n \geq 19$, se presentan aproximaciones por medio de series de Edgeworth.



13. Distribución del estadístico U de Mann-Whitney

Sean X_1, \dots, X_m y Y_1, \dots, Y_n muestras aleatorias.

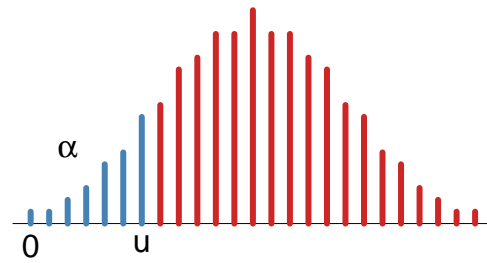
Se define el estadístico de Mann-Whitney U por

$$U = \sum R(X_i) - \frac{m(m+1)}{2}$$

donde $\sum R(X_i)$ denota la suma de los rangos de las X_i en la muestra conjunta de X y Y .

Notas:

- La distribución de U es simétrica en m y n .
- Para valores de m y n mayores a 40, la distribución de U se aproxima mediante la distribución normal.



Sean $F_X(x)$ y $F_Y(y)$ las funciones de probabilidad acumulada de X y Y respectivamente y suponga que $F_X(x) = F_Y(x + \delta)$. Se desea contrastar, con una significancia α , la hipótesis $H_0 : \delta = 0$, contra distintas alternativas H_a .

1. $H_a : \delta > 0$.

Si $U \leq U(\alpha; m, n)$, se rechaza entonces la hipótesis H_0 .

Si $U > U(\alpha; m, n)$, no se rechaza la hipótesis H_0 .

2. $H_a : \delta < 0$.

Si $U \geq mn - U(\alpha; m, n)$, se rechaza entonces la hipótesis H_0 .

Si $U < mn - U(\alpha; m, n)$, no se rechaza la hipótesis H_0 .

3. $H_a : \delta \neq 0$.

Si $U \leq U(\alpha/2; m, n)$ ó $U \geq mn - U(\alpha/2; m, n)$, se rechaza entonces la hipótesis H_0 .

Si $U(\alpha/2; m, n) < U < mn - U(\alpha/2; m, n)$, no se rechaza la hipótesis H_0 .

La prueba Mann-Whitney se puede aplicar para contrastar las medianas η_X y η_Y , de las distribuciones de X y de Y . Si $\eta_X = \eta_Y + \delta$, se puede considerar la hipótesis $H_0 : \delta = 0$, contra las anteriores alternativas I–III. A saber, para $\delta = 0$,

$$H_0 : \eta_X = \eta_Y.$$

1. $H_a : \eta_X < \eta_Y$.

Si $U \leq U(\alpha; m, n)$, se rechaza la hipótesis H_0 en favor de H_a .

2. $H_a : \eta_X > \eta_Y$.

Si $U \geq mn - U(\alpha; m, n)$, se rechaza la hipótesis H_0 en favor de H_a .

3. $H_a : \eta_X \neq \eta_Y$.

Si $U \leq U(\alpha/2; m, n)$ ó $U \geq mn - U(\alpha/2; m, n)$, se rechaza la hipótesis H_0 en favor de H_a .

Tabla 13A.1 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

	$\alpha = 0.01$																			
m	n																			
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
2	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	—	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	—	—	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	—	—	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	—	—	1	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	—	0	1	3	4	6	.	.	.	.	.	.	.	.	.	.	.	.	.
8	—	0	2	4	6	7	9	.	.	.	.	.	.	.	.	.	.	.	.
9	—	1	3	5	7	9	11	14	.	.	.	.	.	.	.	.	.	.	.
10	—	1	3	6	8	11	13	16	19	.	.	.	.	.	.	.	.	.	.
11	—	1	4	7	9	12	15	18	22	25	.	.	.	.	.	.	.	.	.
12	—	2	5	8	11	14	17	21	24	28	31	.	.	.	.	.	.	.	.
13	0	2	5	9	12	16	20	23	27	31	35	39	.	.	.	.	.	.	.
14	0	2	6	10	13	17	22	26	30	34	38	43	47	.	.	.	.	.	.
15	0	3	7	11	15	19	24	28	33	37	42	47	51	56	.	.	.	.	.
16	0	3	7	12	16	21	26	31	36	41	46	51	56	61	66	.	.	.	.
17	0	4	8	13	18	23	28	33	38	44	49	55	60	66	71	77	.	.	.	
18	0	4	9	14	19	24	30	36	41	47	53	59	65	70	76	82	88	.	.	
19	1	4	9	15	20	26	32	38	44	50	56	63	69	75	82	88	94	101	.	
20	1	5	10	16	22	28	34	40	47	53	60	67	73	80	87	93	100	107	114	
21	1	5	11	17	23	30	36	43	50	57	64	71	78	85	92	99	106	113	121	
22	1	5	11	18	24	31	38	45	53	60	67	75	82	90	97	105	112	120	127	
23	1	6	12	19	26	33	40	48	55	63	71	79	87	94	102	110	118	126	134	
24	1	6	13	20	27	35	42	50	58	66	75	83	91	99	108	116	124	133	141	
25	1	7	13	21	29	36	45	53	61	70	78	87	95	104	113	122	130	139	148	
26	1	7	14	22	30	38	47	55	64	73	82	91	100	109	118	127	136	146	155	
27	2	7	15	23	31	40	49	58	67	76	85	95	104	114	123	133	142	152	162	
28	2	8	16	24	33	42	51	60	70	79	89	99	109	119	129	139	149	159	169	
29	2	8	16	25	34	43	53	63	73	83	93	103	113	123	134	144	155	165	176	
30	2	9	17	26	35	45	55	65	76	86	96	107	118	128	139	150	161	172	182	
31	2	9	18	27	37	47	57	68	78	89	100	111	122	133	144	156	167	178	189	
32	2	9	18	28	38	49	59	70	81	92	104	115	127	138	150	161	173	185	196	
33	2	10	19	29	40	50	61	73	84	96	107	119	131	143	155	167	179	191	203	
34	3	10	20	30	41	52	64	75	87	99	111	123	135	148	160	173	185	198	210	
35	3	11	20	31	42	54	66	78	90	102	115	127	140	153	165	178	191	204	217	
36	3	11	21	32	44	56	68	80	93	106	118	131	144	158	171	184	197	211	224	
37	3	11	22	33	45	57	70	83	96	109	122	135	149	162	176	190	203	217	231	
38	3	12	22	34	46	59	72	85	99	112	126	139	153	167	181	195	209	224	238	
39	3	12	23	35	48	61	74	88	101	115	129	144	158	172	187	201	216	230	245	
40	3	13	24	36	49	63	76	90	104	119	133	148	162	177	192	207	222	237	252	

Nota: Los caracteres “—” y “.” se refieren a valores inexistentes y valores que se pueden obtener por simetría respectivamente.

Tabla 13A.2 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

$\alpha = 0.01$		n																		
m	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
21	128	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22	135	143	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23	142	150	158	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24	150	158	167	175	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25	157	166	175	184	192	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26	164	173	183	192	201	211	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27	171	181	191	201	210	220	230	—	—	—	—	—	—	—	—	—	—	—	—	—
28	179	189	199	209	219	230	240	250	—	—	—	—	—	—	—	—	—	—	—	—
29	186	197	207	218	228	239	250	260	271	—	—	—	—	—	—	—	—	—	—	—
30	193	204	215	226	237	248	259	270	282	293	—	—	—	—	—	—	—	—	—	—
31	201	212	223	235	246	258	269	281	292	304	315	—	—	—	—	—	—	—	—	—
32	208	220	232	243	255	267	279	291	303	315	327	339	—	—	—	—	—	—	—	—
33	215	228	240	252	264	277	289	301	314	326	338	351	363	—	—	—	—	—	—	—
34	223	235	248	261	273	286	299	312	324	337	350	363	376	388	—	—	—	—	—	—
35	230	243	256	269	282	295	309	322	335	348	361	375	388	401	414	—	—	—	—	—
36	237	251	264	278	291	305	319	332	346	359	373	387	400	414	428	441	—	—	—	—
37	245	259	273	286	300	314	328	342	356	371	385	399	413	427	441	455	469	—	—	—
38	252	266	281	295	309	324	338	353	367	382	396	411	425	440	454	469	484	498	—	—
39	259	274	289	304	318	333	348	363	378	393	408	423	438	453	468	483	498	513	528	—
40	267	282	297	312	328	343	358	373	389	404	419	435	450	466	481	496	512	527	543	558

Tabla 13B.1 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

$\alpha = 0.025$		n																		
m		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	—	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	—	—	—	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	—	—	0	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	—	1	2	3	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	—	1	3	5	6	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
8	0	2	4	6	8	10	13	.	.	.	.	.	.	.	.	.	.	.	.	.
9	0	2	4	7	10	12	15	17	.	.	.	.	.	.	.	.	.	.	.	.
10	0	3	5	8	11	14	17	20	23	.	.	.	.	.	.	.	.	.	.	.
11	0	3	6	9	13	16	19	23	26	30	.	.	.	.	.	.	.	.	.	.
12	1	4	7	11	14	18	22	26	29	33	37	.	.	.	.	.	.	.	.	.
13	1	4	8	12	16	20	24	28	33	37	41	45	.	.	.	.	.	.	.	.
14	1	5	9	13	17	22	26	31	36	40	45	50	55	.	.	.	.	.	.	.
15	1	5	10	14	19	24	29	34	39	44	49	54	59	64	.	.	.	.	.	.
16	1	6	11	15	21	26	31	37	42	47	53	59	64	70	75	.	.	.	.	.
17	2	6	11	17	22	28	34	39	45	51	57	63	69	75	81	87	.	.	.	.
18	2	7	12	18	24	30	36	42	48	55	61	67	74	80	86	93	99	.	.	.
19	2	7	13	19	25	32	38	45	52	58	65	72	78	85	92	99	106	113	.	.
20	2	8	14	20	27	34	41	48	55	62	69	76	83	90	98	105	112	119	127	.
21	3	8	15	22	29	36	43	50	58	65	73	80	88	96	103	111	119	126	134	.
22	3	9	16	23	30	38	45	53	61	69	77	85	93	101	109	117	125	133	141	.
23	3	9	17	24	32	40	48	56	64	73	81	89	98	106	115	123	132	140	149	.
24	3	10	17	25	33	42	50	59	67	76	85	94	102	111	120	129	138	147	156	.
25	3	10	18	27	35	44	53	62	71	80	89	98	107	117	126	135	145	154	163	.
26	4	11	19	28	37	46	55	64	74	83	93	102	112	122	132	141	151	161	171	.
27	4	11	20	29	38	48	57	67	77	87	97	107	117	127	137	147	158	168	178	.
28	4	12	21	30	40	50	60	70	80	90	101	111	122	132	143	154	164	175	186	.
29	4	13	22	32	42	52	62	73	83	94	105	116	127	138	149	160	171	182	193	.
30	5	13	23	33	43	54	65	76	87	98	109	120	131	143	154	166	177	189	200	.
31	5	14	24	34	45	56	67	78	90	101	113	125	136	148	160	172	184	196	208	.
32	5	14	24	35	46	58	69	81	93	105	117	129	141	153	166	178	190	203	215	.
33	5	15	25	37	48	60	72	84	96	108	121	133	146	159	171	184	197	210	222	.
34	5	15	26	38	50	62	74	87	99	112	125	138	151	164	177	190	203	217	230	.
35	6	16	27	39	51	64	77	89	103	116	129	142	156	169	183	196	210	224	237	.
36	6	16	28	40	53	66	79	92	106	119	133	147	161	174	188	202	216	231	245	.
37	6	17	29	41	55	68	81	95	109	123	137	151	165	180	194	209	223	238	252	.
38	6	17	30	43	56	70	84	98	112	127	141	156	170	185	200	215	230	245	259	.
39	7	18	31	44	58	72	86	101	115	130	145	160	175	190	206	221	236	252	267	.
40	7	18	31	45	59	74	89	103	119	134	149	165	180	196	211	227	243	258	274	.

Tabla 13B.2 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

	$\alpha = 0.025$																			
m	n																			
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
21	142	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	150	158	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	157	166	175	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	165	174	183	192	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	173	182	192	201	211	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	181	191	200	210	220	230	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	188	199	209	219	230	240	250	.	.	.	.	.	.	.	.	.	.	.	.	.
28	196	207	218	228	239	250	261	272	.	.	.	.	.	.	.	.	.	.	.	.
29	204	215	226	238	249	260	271	282	294	.	.	.	.	.	.	.	.	.	.	.
30	212	223	235	247	258	270	282	293	305	317	.	.	.	.	.	.	.	.	.	.
31	220	232	244	256	268	280	292	304	316	328	341	.	.	.	.	.	.	.	.	.
32	227	240	252	265	277	290	302	315	328	340	353	365	.	.	.	.	.	.	.	.
33	235	248	261	274	287	300	313	326	339	352	365	378	391	.	.	.	.	.	.	.
34	243	256	270	283	297	310	323	337	350	364	377	391	404	418	.	.	.	.	.	.
35	251	265	278	292	306	320	334	348	361	375	389	403	417	431	445	.	.	.	.	.
36	259	273	287	301	316	330	344	358	373	387	401	416	430	445	459	473	.	.	.	.
37	267	281	296	311	325	340	355	369	384	399	414	428	443	458	473	488	503	.	.	.
38	275	290	305	320	335	350	365	380	395	411	426	441	456	472	487	502	517	533	.	.
39	282	298	313	329	344	360	376	391	407	422	438	454	469	485	501	516	532	548	564	.
40	290	306	322	338	354	370	386	402	418	434	450	466	482	499	515	531	547	563	579	596

Tabla 13C.1 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

	$\alpha = 0.05$																			
m	n																			
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
2	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	—	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	—	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	0	1	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	0	2	3	5	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	0	2	4	6	8	11	.	.	.	.	.	.	.	.	.	.	.	.	.
8	1	3	5	8	10	13	15	.	.	.	.	.	.	.	.	.	.	.	.
9	1	3	6	9	12	15	18	21	.	.	.	.	.	.	.	.	.	.	.
10	1	4	7	11	14	17	20	24	27	.	.	.	.	.	.	.	.	.	.
11	1	5	8	12	16	19	23	27	31	34	.	.	.	.	.	.	.	.	.
12	2	5	9	13	17	21	26	30	34	38	42	.	.	.	.	.	.	.	.
13	2	6	10	15	19	24	28	33	37	42	47	51	.	.	.	.	.	.	.
14	2	7	11	16	21	26	31	36	41	46	51	56	61	.	.	.	.	.	.
15	3	7	12	18	23	28	33	39	44	50	55	61	66	72	.	.	.	.	.
16	3	8	14	19	25	30	36	42	48	54	60	65	71	77	83	.	.	.	.
17	3	9	15	20	26	33	39	45	51	57	64	70	77	83	89	96	.	.	.	
18	4	9	16	22	28	35	41	48	55	61	68	75	82	88	95	102	109	.	.	
19	4	10	17	23	30	37	44	51	58	65	72	80	87	94	101	109	116	123	.	
20	4	11	18	25	32	39	47	54	62	69	77	84	92	100	107	115	123	130	138	
21	5	11	19	26	34	41	49	57	65	73	81	89	97	105	113	121	130	138	146	
22	5	12	20	28	36	44	52	60	68	77	85	94	102	111	119	128	136	145	154	
23	5	13	21	29	37	46	54	63	72	81	90	98	107	116	125	134	143	152	161	
24	6	13	22	30	39	48	57	66	75	85	94	103	113	122	131	141	150	160	169	
25	6	14	23	32	41	50	60	69	79	89	98	108	118	128	137	147	157	167	177	
26	6	15	24	33	43	53	62	72	82	92	103	113	123	133	143	154	164	174	185	
27	7	15	25	35	45	55	65	75	86	96	107	117	128	139	149	160	171	182	192	
28	7	16	26	36	46	57	68	78	89	100	111	122	133	144	156	167	178	189	200	
29	7	17	27	38	48	59	70	82	93	104	116	127	138	150	162	173	185	196	208	
30	7	17	28	39	50	61	73	85	96	108	120	132	144	156	168	180	192	204	216	
31	8	18	29	40	52	64	76	88	100	112	124	136	149	161	174	186	199	211	224	
32	8	19	30	42	54	66	78	91	103	116	128	141	154	167	180	193	206	218	231	
33	8	19	31	43	56	68	81	94	107	120	133	146	159	172	186	199	212	226	239	
34	9	20	32	45	57	70	84	97	110	124	137	151	164	178	192	206	219	233	247	
35	9	21	33	46	59	73	86	100	114	128	141	156	170	184	198	212	226	241	255	
36	9	21	34	48	61	75	89	103	117	131	146	160	175	189	204	219	233	248	263	
37	10	22	35	49	63	77	91	106	121	135	150	165	180	195	210	225	240	255	271	
38	10	23	36	50	65	79	94	109	124	139	154	170	185	201	216	232	247	263	278	
39	10	23	38	52	67	82	97	112	128	143	159	175	190	206	222	238	254	270	286	
40	11	24	39	53	68	84	99	115	131	147	163	179	196	212	228	245	261	278	294	

Tabla 13C.2 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

	$\alpha = 0.05$																				
m	n																				
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
21	154	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	162	171	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	170	179	189	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	179	188	198	207	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	187	197	207	217	227	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	195	205	216	226	237	247	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	203	214	225	236	247	257	268	.	.	.	.	.	.	.	.	.	.	.	.	.
28	212	223	234	245	257	268	279	291	.	.	.	.	.	.	.	.	.	.	.	.
29	220	231	243	255	267	278	290	302	314	.	.	.	.	.	.	.	.	.	.	.
30	228	240	252	264	277	289	301	313	325	338	.	.	.	.	.	.	.	.	.	.
31	236	249	261	274	287	299	312	325	337	350	363	.	.	.	.	.	.	.	.	.
32	244	257	271	284	297	310	323	336	349	362	375	388	.	.	.	.	.	.	.	.
33	253	266	280	293	307	320	334	347	361	374	388	402	415	.	.	.	.	.	.	.
34	261	275	289	303	317	331	345	359	373	387	401	415	429	443	.	.	.	.	.	.
35	269	284	298	312	327	341	356	370	384	399	413	428	442	457	471	.	.	.	.	.
36	277	292	307	322	337	352	366	381	396	411	426	441	456	471	486	501	.	.	.	.
37	286	301	316	331	347	362	377	393	408	423	439	454	470	485	500	516	531	.	.	.	
38	294	310	325	341	357	373	388	404	420	436	452	467	483	499	515	531	547	563	.	.	
39	302	318	335	351	367	383	399	416	432	448	464	481	497	513	529	546	562	578	595	.	
40	311	327	344	360	377	394	410	427	444	460	477	494	511	527	544	561	578	594	611	628	

Tabla 13D.1 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

	$\alpha = 0.10$																			
m	n																			
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
2	—	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3	—	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
4	0	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
5	1	2	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
6	1	3	5	7	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.
7	1	4	6	8	11	13	.	.	.	.	.	.	.	.	.	.	.	.	.
8	2	5	7	10	13	16	19	.	.	.	.	.	.	.	.	.	.	.	.
9	2	5	9	12	15	18	22	25	.	.	.	.	.	.	.	.	.	.	.
10	3	6	10	13	17	21	24	28	32	.	.	.	.	.	.	.	.	.	.
11	3	7	11	15	19	23	27	31	36	40	.	.	.	.	.	.	.	.	.
12	4	8	12	17	21	26	30	35	39	44	49	.	.	.	.	.	.	.	.
13	4	9	13	18	23	28	33	38	43	48	53	58	.	.	.	.	.	.	.
14	4	10	15	20	25	31	36	41	47	52	58	63	69	.	.	.	.	.	.
15	5	10	16	22	27	33	39	45	51	57	63	68	74	80	.	.	.	.	.
16	5	11	17	23	29	36	42	48	54	61	67	74	80	86	93	.	.	.	.
17	6	12	18	25	31	38	45	52	58	65	72	79	85	92	99	106	.	.	.	
18	6	13	20	27	34	41	48	55	62	69	77	84	91	98	106	113	120	.	.	
19	7	14	21	28	36	43	51	58	66	73	81	89	97	104	112	120	128	135	.	
20	7	15	22	30	38	46	54	62	70	78	86	94	102	110	119	127	135	143	151	
21	8	15	23	31	40	48	56	65	73	82	91	99	108	116	125	134	142	151	160	
22	8	16	25	33	42	51	59	68	77	86	95	104	113	122	131	141	150	159	168	
23	8	17	26	35	44	53	62	72	81	90	100	109	119	128	138	147	157	167	176	
24	9	18	27	36	46	56	65	75	85	95	105	114	124	134	144	154	164	174	184	
25	9	19	28	38	48	58	68	78	89	99	109	120	130	140	151	161	172	182	193	
26	10	20	30	40	50	61	71	82	92	103	114	125	136	146	157	168	179	190	201	
27	10	20	31	41	52	63	74	85	96	107	119	130	141	152	164	175	186	198	209	
28	11	21	32	43	54	66	77	88	100	112	123	135	147	158	170	182	194	206	217	
29	11	22	33	45	56	68	80	92	104	116	128	140	152	164	177	189	201	213	226	
30	12	23	35	46	58	71	83	95	108	120	133	145	158	170	183	196	209	221	234	
31	12	24	36	48	61	73	86	99	111	124	137	150	163	177	190	203	216	229	242	
32	13	25	37	50	63	76	89	102	115	129	142	156	169	183	196	210	223	237	251	
33	13	26	38	51	65	78	92	105	119	133	147	161	175	189	203	217	231	245	259	
34	13	26	40	53	67	81	95	109	123	137	151	166	180	195	209	224	238	253	267	
35	14	27	41	55	69	83	98	112	127	141	156	171	186	201	216	230	245	260	275	
36	14	28	42	56	71	86	100	115	131	146	161	176	191	207	222	237	253	268	284	
37	15	29	43	58	73	88	103	119	134	150	166	181	197	213	229	244	260	276	292	
38	15	30	45	60	75	91	106	122	138	154	170	186	203	219	235	251	268	284	300	
39	16	31	46	61	77	93	109	126	142	158	175	192	208	225	242	258	275	292	309	
40	16	31	47	63	79	96	112	129	146	163	180	197	214	231	248	265	282	300	317	

Tabla 13D.2 Valores críticos $U_{(\alpha;m,n)}$ del estadístico de Mann-Whitney

m	$\alpha = 0.10$																																	
	21	22	23	24	25	26	27	28	29	n										30	31	32	33	34	35	36	37	38	39	40				
21	168	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	177	186	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	186	195	205	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	194	204	215	225	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
25	203	214	224	235	245	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	212	223	234	245	256	267	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	221	232	243	255	266	278	289	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
28	229	241	253	265	277	289	301	313	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
29	238	250	263	275	287	300	312	324	337	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	247	260	272	285	298	311	324	336	349	362	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
31	255	269	282	295	308	322	335	348	362	375	388	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
32	264	278	292	305	319	333	346	360	374	388	401	415	429	443	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
33	273	287	301	315	330	344	358	372	386	401	415	429	443	457	472	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	282	296	311	326	340	355	369	384	399	413	428	443	457	472	487	502	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	290	306	321	336	351	366	381	396	411	426	441	457	472	487	502	517	533	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	299	315	330	346	361	377	392	408	424	439	455	470	486	502	517	533	549	565	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37	308	324	340	356	372	388	404	420	436	452	468	484	500	516	532	549	565	581	597	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
38	317	333	350	366	382	399	415	432	448	465	481	498	515	531	548	564	581	597	614	631	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	325	342	359	376	393	410	427	444	461	478	495	512	529	546	563	580	597	614	631	648	665	.	.	.	.	.	.	.	.	.	.	.	.	.
40	334	352	369	386	404	421	438	456	473	491	508	526	543	561	578	595	613	630	648	665	683	700	.	.	.	.	.	.	.	.	.	.	.	.



14. Distribución del estadístico D de Kolmogorov-Smirnov

Sea F^* la distribución conocida, F la distribución de la variable X y F_n la función de distribución empírica. Se supone que X es una variable aleatoria continua.

Para probar: $H_0: F(x) = F^*(x)$

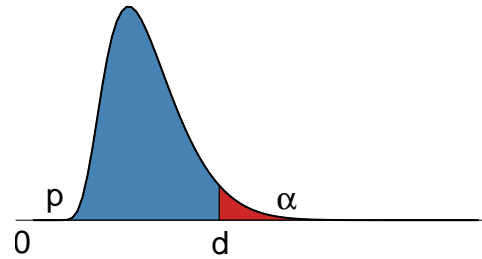
$$D = \sup_x \{|F^*(x) - F_n(x)|\}$$

Para probar: $H_0: F(x) \geq F^*(x)$

$$D^+ = \sup_x \{F^*(x) - F_n(x)\}$$

Para probar: $H_0: F(x) \leq F^*(x)$

$$D^- = \sup_x \{F_n(x) - F^*(x)\}$$



En los tres casos, la hipótesis nula debe rechazarse si el estadístico correspondiente es mayor que el cuantil al nivel de significancia deseado¹. Para $n > 50$ se presenta una aproximación del cuantil correcto utilizando la distribución asintótica de los estadísticos².

Tabla 14. Valores críticos $D_{(\alpha;n)}^+$ de la distribución de Kolmogorov-Smirnov.

n	p				n	p			
	0.99	0.975	0.95	0.90		0.99	0.975	0.95	0.90
	α					α			
	0.01	0.025	0.05	0.010		0.01	0.025	0.05	0.10
1	0.990	0.975	0.950	0.900	26	0.290	0.259	0.233	0.204
2	0.900	0.842	0.776	0.684	27	0.284	0.254	0.229	0.200
3	0.785	0.708	0.636	0.565	28	0.279	0.250	0.225	0.197
4	0.689	0.624	0.565	0.493	29	0.275	0.246	0.221	0.193
5	0.627	0.563	0.509	0.447	30	0.270	0.242	0.218	0.190
6	0.577	0.519	0.468	0.410	31	0.266	0.238	0.214	0.187
7	0.538	0.483	0.436	0.382	32	0.262	0.234	0.211	0.184
8	0.507	0.454	0.410	0.358	33	0.258	0.231	0.208	0.182
9	0.480	0.430	0.387	0.339	34	0.254	0.227	0.205	0.179
10	0.457	0.409	0.369	0.323	35	0.251	0.224	0.202	0.177
11	0.437	0.391	0.352	0.308	36	0.247	0.221	0.199	0.174
12	0.419	0.375	0.338	0.296	37	0.244	0.218	0.196	0.172
13	0.404	0.361	0.326	0.285	38	0.241	0.215	0.194	0.170
14	0.390	0.349	0.314	0.275	39	0.238	0.213	0.191	0.168
15	0.377	0.338	0.304	0.266	40	0.235	0.210	0.189	0.165
16	0.366	0.327	0.295	0.258	41	0.232	0.208	0.187	0.163
17	0.355	0.318	0.286	0.250	42	0.229	0.205	0.185	0.162
18	0.346	0.309	0.279	0.244	43	0.227	0.203	0.183	0.160
19	0.337	0.301	0.271	0.237	44	0.224	0.201	0.181	0.158
20	0.329	0.294	0.265	0.232	45	0.222	0.198	0.179	0.156
21	0.321	0.287	0.259	0.226	46	0.219	0.196	0.177	0.155
22	0.314	0.281	0.253	0.221	47	0.217	0.194	0.175	0.153
23	0.307	0.275	0.247	0.216	48	0.215	0.192	0.173	0.151
24	0.301	0.269	0.242	0.212	49	0.213	0.190	0.171	0.150
25	0.295	0.264	0.238	0.208	50	0.211	0.188	0.170	0.148
					$n > 50$	$\frac{1.517}{\sqrt{n}}$	$\frac{1.358}{\sqrt{n}}$	$\frac{1.224}{\sqrt{n}}$	$\frac{1.073}{\sqrt{n}}$

¹La distribución del estadístico D^- es la misma que la de D^+ . Los valores críticos para el estadístico D son los presentados para el nivel 2α .

²El error de aproximación es menor que 4×10^{-3} para ambas pruebas.



15. Distribución del estadístico W^+ de Wilcoxon

Sea X_1, X_2, \dots, X_n una muestra aleatoria.

$$W^+ = \sum R_i I_{\{X_i > 0\}}$$

donde R_i es el rango de X_i e $I_{\{\cdot\}}$ es la función indicadora.

$$p = \Pr(W^+ \leq w)$$

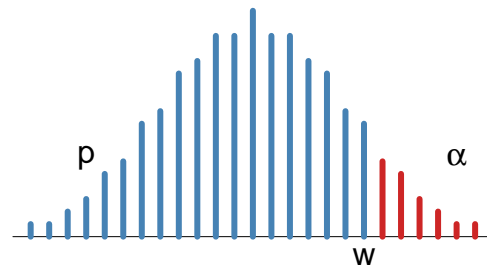


Tabla 15A. Probabilidades acumuladas $\Pr(W_n^+ \leq w)$ de la distribución del estadístico W_n^+ de Wilcoxon.

w	n								
	2	3	4	5	6	7	8	9	10
0	0.2500	0.1250	0.0625	0.0312	0.0156	0.0078	0.0039	0.0020	0.0010
1	0.5000	0.2500	0.1250	0.0625	0.0312	0.0156	0.0078	0.0039	0.0020
2	0.7500	0.3750	0.1875	0.0938	0.0469	0.0234	0.0117	0.0059	0.0029
3	1.0000	0.6250	0.3125	0.1562	0.0781	0.0391	0.0195	0.0098	0.0049
4		0.7500	0.4375	0.2188	0.1094	0.0547	0.0273	0.0137	0.0068
5		0.8750	0.5625	0.3125	0.1562	0.0781	0.0391	0.0195	0.0098
6		1.0000	0.6875	0.4062	0.2188	0.1094	0.0547	0.0273	0.0137
7			0.8125	0.5000	0.2812	0.1484	0.0742	0.0371	0.0186
8			0.8750	0.5938	0.3438	0.1875	0.0977	0.0488	0.0244
9			0.9375	0.6875	0.4219	0.2344	0.1250	0.0645	0.0322
10			1.0000	0.7812	0.5000	0.2891	0.1562	0.0820	0.0420
11				0.8438	0.5781	0.3438	0.1914	0.1016	0.0527
12				0.9062	0.6562	0.4062	0.2305	0.1250	0.0654
13				0.9375	0.7188	0.4688	0.2734	0.1504	0.0801
14				0.9688	0.7812	0.5312	0.3203	0.1797	0.0967
15				1.0000	0.8438	0.5938	0.3711	0.2129	0.1162
:					:	:	:	:	:
39								0.9805	0.8838
40								0.9863	0.9033
41								0.9902	0.9199
42								0.9941	0.9346
43								0.9961	0.9473
44								0.9980	0.9580
45								1.0000	0.9678
46									0.9756
47									0.9814
48									0.9863
49									0.9902
50									0.9932
51									0.9951
52									0.9971
53									0.9980
54									0.9990
55									1.0000

Tabla 15B. Valores críticos $w_{(\alpha;n)}^+$ de la distribución de Wilcoxon.

n	p								$n(n+1)/2$
	0.01	0.025	0.05	0.10	0.90	0.95	0.975	0.99	
	α								
	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	
10	6	9	11	15	40	44	46	49	55
11	8	11	14	18	48	52	55	58	66
12	10	14	18	22	56	60	64	68	78
13	13	18	22	27	64	69	73	78	91
14	16	22	26	32	73	79	83	89	105
15	20	26	31	37	83	89	94	100	120
16	24	30	36	43	93	100	106	112	136
17	28	35	42	49	104	111	118	125	153
18	33	41	48	56	115	123	130	138	171
19	38	47	54	63	127	136	143	152	190
20	44	53	61	70	140	149	157	166	210
21	50	59	68	78	153	163	172	181	231
22	56	66	76	87	166	177	187	197	253
23	63	74	84	95	181	192	202	213	276
24	70	82	92	105	195	208	218	230	300
25	77	90	101	114	211	224	235	248	325
26	85	99	111	125	226	240	252	266	351
27	93	108	120	135	243	258	270	285	378
28	102	117	131	146	260	275	289	304	406
29	111	127	141	158	277	294	308	324	435
30	121	138	152	170	295	313	327	344	465
31	131	148	164	182	314	332	348	365	496
32	141	160	176	195	333	352	368	387	528
33	152	171	188	208	353	373	390	409	561
34	163	183	201	222	373	394	412	432	595
35	174	196	214	236	394	416	434	456	630
36	186	209	228	251	415	438	457	480	666
37	199	222	242	266	437	461	481	504	703
38	212	236	257	282	459	484	505	529	741
39	225	250	272	298	482	508	530	555	780
40	239	265	287	314	506	533	555	581	820

Notas:

1. En esta tabla $\alpha = \Pr(W^+ \geq w_{(\alpha;n)})$.
2. La distribución de W^+ es simétrica alrededor de $n(n+1)/2$, por lo que

$$w_{(p,n)} = \frac{n(n+1)}{2} - w_{(1-p,n)}$$

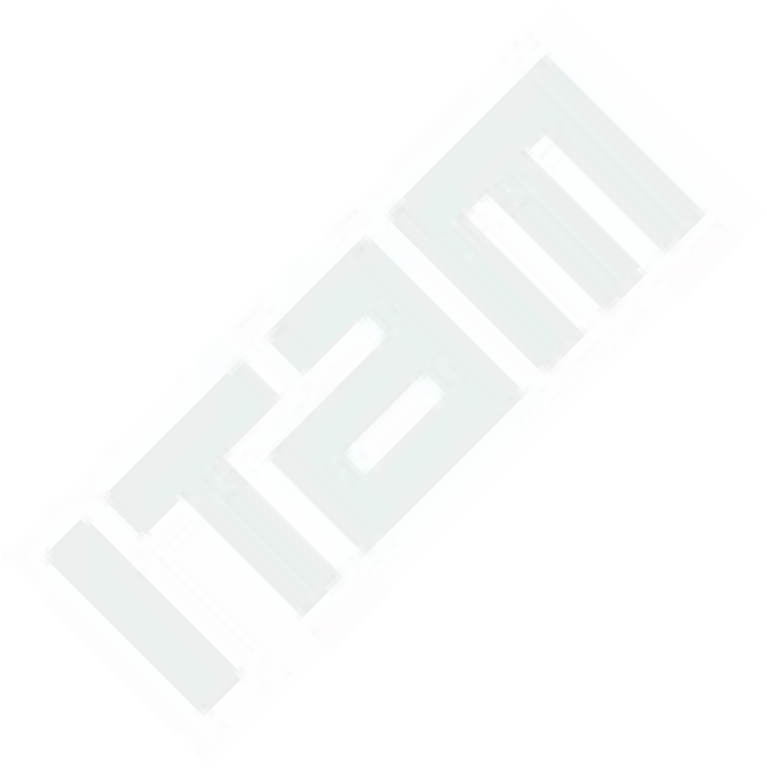
3. Para $n > 40$ puede utilizar la aproximación

$$w_{(p,n)} \approx \frac{n(n+1)}{4} + z_p \sqrt{\frac{n(n+1)(2n+1)}{24}}$$

donde z_p es el p -ésimo cuantil de la distribución normal estándar, i.e., $p = \Phi(z_p)$.

16. 1050 Números Seudoaleatorios

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	82207	32971	61821	07315	05123	49509	90787	40307	17954	39359	03509	41932	43282	68591	47877
2	08782	88748	93209	02753	51060	20520	95553	00304	79373	25619	30230	70305	21380	27406	84985
3	03897	78310	00843	36634	88682	01283	18719	05062	58450	03007	18043	82009	48034	04251	18956
4	31066	29277	39356	68641	93508	67156	48082	82129	77012	73662	58886	12708	29393	07233	91496
5	70691	36787	30040	86232	45147	26600	06145	34248	55430	73805	69535	70709	07467	33263	75402
6	05473	12332	29330	91235	71281	56367	92870	67289	15497	91458	86862	66026	36217	26543	94725
7	66636	94524	39277	13253	56450	27705	40385	45780	46888	01992	24363	24922	39112	91854	27677
8	72813	65324	37927	59485	56667	31734	65678	88267	67990	38285	03004	37612	68859	42143	99716
9	50139	20777	09743	09944	51075	08054	08237	56341	60524	11440	77426	12225	83228	30083	08031
10	08305	08720	45241	56392	70316	22790	49750	27856	88651	20872	45309	45738	63223	31353	75646
11	09732	10854	21679	23452	78626	03967	32638	34731	13096	89622	96556	49203	16957	86919	82242
12	06394	20244	41751	02024	92900	98611	93004	67680	43594	64250	76547	77016	86194	34316	13515
13	11775	46653	28843	57869	78131	14760	05781	80610	98863	25172	13139	84419	50756	13884	93264
14	05492	36719	45201	34011	53980	16243	96598	63744	62028	69860	61257	80528	66348	06244	19489
15	84217	03832	39880	90499	51196	27703	33593	78317	98902	82734	32279	00439	28388	80217	18720
16	35602	93562	46721	58406	74254	18811	08743	41168	27447	70694	54801	95152	52571	14835	59536
17	18937	31233	69786	27423	61189	73842	95420	28386	07615	05336	82037	09500	63224	55901	05859
18	09063	72987	22942	73570	99178	74670	86925	52416	42298	05322	04194	59593	64814	89117	81064
19	68686	29310	27737	41013	71361	70101	87117	73214	13145	54469	17946	22718	04640	11577	44776
20	94005	63168	99225	32729	38332	20433	80957	93792	42603	04600	76042	58495	60616	50111	07848
21	68729	09294	20553	60615	47547	95868	27575	28445	75083	57291	15750	11610	63546	35273	17333
22	61437	46400	83356	93696	41961	82064	74905	22200	22864	27586	02415	69494	69663	64862	81553
23	67205	52661	44940	65867	47850	19618	34954	96868	98198	38242	04384	93983	78381	35914	46828
24	81435	01444	69273	83712	04884	12117	82171	64567	26240	77157	03304	74675	27520	33186	50510
25	35931	83937	10333	78759	05037	03009	45646	70365	71554	02507	35697	47666	63533	34112	90591
26	29107	34375	28918	02651	32807	86061	07634	48297	02864	68798	84678	96942	07619	24987	92411
27	90077	02749	73330	41414	95824	65587	40375	67842	49525	63674	03170	48362	40050	05777	08439
28	94296	76997	31616	37554	08270	67042	32544	29185	15643	06072	70927	71644	71104	04424	16527
29	78466	24707	06113	49373	50945	95451	58550	42748	77981	78868	49284	07178	37543	48830	43691
30	24715	47704	81971	80046	58200	93027	44994	77322	30296	82056	59420	77465	08361	06568	49460
31	87308	60352	89109	15387	87582	35140	53967	38850	90938	54470	70389	35013	44122	33961	54571
32	96027	08859	53132	31129	21942	78718	43613	90474	61483	00138	88732	75923	29391	15449	04077
33	50097	07108	72610	27253	86750	28086	39437	67703	17628	06197	50731	29454	39432	73065	03546
34	13275	51460	87908	30894	31955	03957	32518	67123	16800	83785	51182	35737	45671	22024	02831
35	34327	31136	78592	39142	86501	72157	63527	74013	76571	87286	06946	13135	90821	12435	11876
36	44247	78593	55878	43412	43229	18323	89169	07109	60604	10544	27785	35265	46138	61232	49986
37	26040	85864	16778	71500	71092	13622	92687	44602	49380	20154	74640	69627	56552	02323	97439
38	78618	40504	02604	57240	06697	23727	63192	16315	90958	04616	17027	00662	07209	34427	97181
39	87347	99792	18053	68564	62756	08622	15321	90718	29674	82069	33948	49601	97345	18781	04994
40	80088	22869	56309	44646	22752	91753	08212	79369	50526	42499	16318	12735	13826	66726	90387
41	48543	65583	01521	16999	97872	10458	39045	38358	00317	60506	00099	93084	33072	42085	33138
42	12746	72369	88929	07235	44319	34906	78656	34954	74594	96445	51104	54658	32172	50619	06772
43	54959	24443	22348	87977	95615	61691	65636	20590	28991	11429	66437	06514	81454	73091	93854
44	63750	64262	57639	90103	14477	79209	75450	91035	04374	16419	89987	18093	36065	84075	82521
45	31078	98829	00648	58021	95043	59644	46876	07478	71748	35035	28377	78314	44956	73710	42747
46	43124	64862	36209	29283	60822	66093	00365	48681	58598	63975	04758	95095	11269	05001	23589
47	43025	74904	27636	84706	67750	72582	36718	04183	22380	96030	54652	16280	48384	36434	41464
48	79155	22329	61951	18687	32898	02136	43242	60520	87246	43448	60134	82182	66493	45007	93803
49	69978	33341	57891	24062	72470	81311	20359	67782	29891	66677	16188	83486	31076	00575	60955
50	95986	86287	20945	28844	18291	87287	06384	05109	22216	29425	45199	17817	42741	64886	82736
51	89260	01121	89550	86257	48235	35045	11439	37364	28969	16983	31708	09253	22202	35854	98413
52	70348	95862	10251	85670	30137	89658	21653	94004	41721	47262	27860	87321	20735	04350	55524
53	36057	56642	69166	42068	99118	22337	58790	94750	79523	43035	90875	47546	79240	58578	92376
54	14822	56346	34764	01974	96148	31068	28547	27859	65449	46979	40955	99165	61754	87738	34071
55	14861	05403	98439	63040	81557	96735	23649	69837	08667	13695	71573	60711	35702	08571	01896
56	92519	01665	42921	70981	69109	24056	61950	82158	73354	94756	85887	48311	51023	28261	15316
57	33432	78296	80872	91904	49754	55938	98134	83517	95264	30988	03039	19727	41776	53424	78041
58	85477	95660	43894	51113	31450	27637	75221	22127	14441	82722	98994	89319	00185	89949	11289
59	96733	11979	58208	47759	30551	38510	65681	74183	61242	14056	96089	39000	78819	82582	94105
60	95071	31306	51364	90976	23021	18136	89260	99351	03051	04622	75100	05123	32264	78105	38241
61	31762	50916	33590	22597	60078	96242	55968	07185	01308	01061	84467	25558	92507	90732	63759
62	74194	44604	83439	85492	28450	14910	81475	07563	45893	88970	64756	78089	45884	80353	01839
63	08009	73767	82915	35867	78324	94670	20362	24641	53489	06511	67402	90585	35593	92179	92200
64	19493	59379	53859	04117	96045	43959	20782	39648	88951	53974	32391	52822	31603	87594	35509
65	81881	47467	29274	30934	22320	73655	72771	44895	87941	85621	92089	40424	80042	76452	88664
66	65602	02360	40533	54264	36303	19012	03235	65292	43814	94427	93421	05174	16599	76135	60482
67	64218	33987	84448	44521	87606	05917	19605	15402	76479	73181	33173	38720	83412	53840	43411
68	15774	49562	70491	11895	48996	70008	39219	60029	35009	72325	51324	28218	83398	72611	36070
69	14027	23287	32715	90935	13858	21421	54507	80184	00922	41586	07130	76427	12043	25585	57165
70	51995	52431	58043	62695	51833	92116	87174	95566	09210	65367	38960	99917	35136	01280	16504



Bibliografía

- [1] D. J. Best and D. E. Roberts. Algorithm AS 89: The Upper Tail Probabilities of Spearman's Rho. *Applied Statistics*, 24:377–379, 1975.
- [2] Z. W. Birnbaum and F. H. Tingey. One-Sided Confidence Contours for Probability Distribution Functions. *The Annals of Mathematical Statistics*, 22:592–596, 1951.
- [3] W. J. Conover. *Practical Nonparametric Statistics*. Wiley, 1980.
- [4] David B. Dahl. *xtable: Export tables to LaTeX or HTML*, 2014. R package version 1.7-4.
- [5] S. T. David, M. G. Kendall, and A. Stuart. Some Questions of Distribution in the Theory of Rank Correlation. *Biometrika*, 38:131–140, 1951.
- [6] L. C. Dinneen and B. C. Blakesley. Algorithm AS 62: A Generator for the Sampling Distribution of the Mann-Whitney U Statistic. *Applied Statistics*, 22:269–273, 1973.
- [7] J. Durbin and G. S. Watson. Testing for Serial Correlation in Least Squares Regression I. *Biometrika*, 37:409–428, 1950.
- [8] J. Durbin and G. S. Watson. Testing for Serial Correlation in Least Squares Regression II. *Biometrika*, 38:159–179, 1951.
- [9] J. Durbin and G. S. Watson. Testing for Serial Correlation in Least Squares Regression III. *Biometrika*, 58:1–19, 1971.
- [10] W. Feller. On the Kolmogorov-Smirnov Limit Theorems for Empirical Distributions. *The Annals of Mathematical Statistics*, 19:177–189, 1948.
- [11] L^AT_EX. – *A document preparation system*. 2009. URL: <http://www.latex-project.org>.
- [12] H. B. Mann and D. R. Whitney. On a Test of Whether one of Two Random Variables is Stochastically Larger than the Other. *The Annals of Mathematical Statistics*, 18:50–60, 1947.
- [13] G. Marsaglia, W. W. Tsang, and J. Wang. Evaluating Kolmogorov's Distribution. *Journal of Statistical Software*, 8:1–6, 1999.
- [14] L. H. Miller. Table of Percentage Points of Kolmogorov Statistics. *Journal of the American Statistical Association*, 51:11–121, 1956.
- [15] R. C. Milton. An Extended Table of Critical Values for the Mann-Whitney (Wilcoxon) Two-Sample Statistic. *Journal of the American Statistical Association*, 59:925–934, 1964.
- [16] E. G. Olds. Distributions of Sums of Squares of Rank Differences for Small Numbers of Individuals. *The Annals of Mathematical Statistics*, 9:133–148, 1938.
- [17] R Development Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria, 2015.
- [18] P. H. Ramsey. Critical Values for Spearman's Rank Order Correlation. *Journal of Educational Statistics*, 14:245–253, 1989.
- [19] N. E. Savin and K. J. White. The Durbin-Watson Test for Serial Correlation with Extreme Sample Sizes or Many Regressors. *Econometrica*, 45:1989–1996, 1977.
- [20] A. Wald and J. Wolfowitz. On a Test Whether Two Samples are from the Same Population. *The Annals of Mathematical Statistics*, 11:147–162, 1940.
- [21] J. H. Zar. Testing of the Spearman Rank Correlation Coefficient. *Journal of the American Statistical Association*, 67:578–580, 1972.