Condicional: $\mathbb{P}(A|B) = \dfrac{\mathbb{P}(A \cap B)}{\mathbb{P}(A)}$

$A, B$ indep $\rightarrow \mathbb{P}(A|B) = \mathbb{P}(A)$ ; $\mathbb{P}(A \cap B) = \mathbb{P}(A)\,\mathbb{P}(B)$

Generalización de VA: $f_x(x) = \sum_{y \in X} p_x(y)\, \delta(x-y)$

Bayes: $\mathbb{P}(A|B) = \dfrac{\mathbb{P}(B|A)\,\mathbb{P}(A)}{\mathbb{P}(B)}$

$$\mathbb{P}(B) = \sum_{i=1}^{n} \mathbb{P}(B \cap A_i) = \sum_{i=1}^{n} \mathbb{P}(B|A_i)\,\mathbb{P}(A_i)$$

$$f_{x_n}(x) = \frac{\partial^n}{\partial x_n} F_{x_n}(x) \longleftarrow F_{x_n}(x) = \int_{-\infty}^{x_n} f_{x_n}(x)\, dx_n$$

n

$$F_{X|A}(x) = \frac{\mathbb{P}(X \leq x, A)}{\mathbb{P}(A)}$$

Sea $y = \sum x_i$ suma de VA indep

$$f_y(y) = f_{x_1} * f_{x_2} * \dots f_{x_n}$$

Transformación biyectiva y suave

$$\vec{y} = g(\vec{x}) : \mathbb{R}^n \rightarrow \mathbb{R}^n \qquad J_x = \begin{vmatrix} \frac{\partial g_1}{\partial x_1} & \cdots & \frac{\partial g_1}{\partial x_n} \\ \vdots & \ddots & \\ \frac{\partial g_n}{\partial x_1} & \cdots & \frac{\partial g_n}{\partial x_n} \end{vmatrix}$$

$$f_{\vec{y}}(\vec{y}) = \frac{f_{\vec{x}}(\vec{x})}{|\det(J(g))|}$$

Evaluás en la inversa $g^{-1}(\vec{y}) = \vec{x}$

módulo del determinante del Jacobiano

f marginal: $f_{x_1}(x_1) = \int f_{\vec{x}}(\vec{x})\, dx_{2,3\dots}$

n veces — las que sacás

$$Var(x) = \sigma_x^2 = E\left[(x-\mu_x)^2\right]$$

$\sigma_x \rightarrow$ desvío estándar

$$f_{x|y}(x|y) = \frac{f_{x,y}(x,y)}{f_y(y)}$$

$$E[g(x)] = \int_{-\infty}^{-\infty} g(x)\, f_x(x)\, dx \qquad E[ax+b] = a\,E[x]+b$$

Media $\rightarrow E[x]$

A,B indep: $f_{A,B}(a,b) = f_A \cdot f_B \qquad F_{A,B}(a,b) = F_A \cdot F_B$

| Distribución | Notación | $p_X(x)$ | Soporte | Parámetros | $\mathbf{E}[X]$ | $\mathbf{var}(X)$ |
|---|---|---|---|---|---|---|
| Bernoulli | $\mathrm{Ber}(p)$ | $p^x(1-p)^{1-x}$ | $\{0,1\}$ | $p \in (0,1)$ | $p$ | $p(1-p)$ |
| Binomial | $\mathcal{B}(n,p)$ | $\binom{n}{x}p^x(1-p)^{n-x}$ | $[\![0,n]\!]$ | $p \in (0,1),\ n \in \mathbb{N}$ | $np$ | $np(1-p)$ |
| Geométrica | $\mathcal{G}(p)$ | $(1-p)^{x-1}p$ | $\mathbb{N}$ | $p \in (0,1)$ | $1/p$ | $(1-p)/p^2$ |
| Pascal | $\mathrm{Pas}(k,p)$ | $\binom{x-1}{k-1}(1-p)^{x-k}p^k$ | $\mathbb{Z}_k$ | $p \in (0,1),\ k \in \mathbb{N}$ | $k/p$ | $k(1-p)/p^2$ |
| Poisson | $\mathrm{Poi}(\mu)$ | $(\mu^x e^{-\mu})/x!$ | $\mathbb{Z}_0$ | $\mu > 0$ | $\mu$ | $\mu$ |
| Hipergeométrica | $\mathcal{H}(N,d,n)$ | $\frac{\binom{d}{x}\binom{N-d}{n-x}}{\binom{N}{n}}$ | $[\![m,M]\!]^\dagger$ | $d \leq N,\ n \leq N \in \mathbb{N}$ | $\frac{nd}{N}$ | $\frac{nd(N-d)(N-n)}{N^2(N-1)}$ |

| Distribución | Notación | $f_X(x)$ | Soporte | Parámetros | $\mathbf{E}[X]$ | $\mathbf{var}(X)$ |
|---|---|---|---|---|---|---|
| Uniforme | $\mathcal{U}[a,b]$ | $1/(b-a)$ | $[a,b]$ | $a < b$ | $(a+b)/2$ | $(b-a)^2/12$ |
| Exponencial | $\mathcal{E}(\lambda)$ | $\lambda e^{-\lambda x}$ | $[0,+\infty)$ | $\lambda > 0$ | $1/\lambda$ | $1/\lambda^2$ |
| Gamma | $\Gamma(\nu,\lambda)$ | $\frac{\lambda^\nu}{\Gamma(\nu)}x^{\nu-1}e^{-\lambda x}$ | $[0,+\infty)$ | $\nu > 0, \lambda > 0$ | $\nu/\lambda$ | $\nu/\lambda^2$ |
| Normal | $\mathcal{N}(\mu,\sigma^2)$ | $\frac{1}{\sqrt{2\pi}\sigma}e^{\frac{-(x-\mu)^2}{2\sigma^2}}$ | $\mathbb{R}$ | $\mu \in \mathbb{R}, \sigma^2 > 0$ | $\mu$ | $\sigma^2$ |
| Chi cuadrado | $\chi^2_k$ | $\frac{1}{2^{\frac{k}{2}}\Gamma(\frac{k}{2})}x^{\frac{k}{2}-1}e^{-\frac{x}{2}}$ | $[0,+\infty)$ | $k \in \mathbb{N}$ | $k$ | $2k$ |
| $t$-Student | $t_\nu$ | $\frac{\Gamma(\frac{\nu+1}{2})}{\sqrt{\nu\pi}\Gamma(\frac{\nu}{2})}\left(1+\frac{t^2}{\nu}\right)^{-\frac{\nu+1}{2}}$ | $\mathbb{R}$ | $\nu > 0$ | $0$ | $\frac{\nu}{\nu-2}*$ |
| Weibull | $\mathrm{Wei}(c,\alpha)$ | $\frac{c}{\alpha}(\frac{x}{\alpha})^{c-1}e^{-(\frac{x}{\alpha})^c}$ | $[0,+\infty)$ | $c > 0, \alpha > 0$ | $\alpha\Gamma(1+\frac{1}{c})$ | $\alpha^2\left[\Gamma(1+\frac{2}{c}) - \Gamma^2(1+\frac{1}{c})\right]$ |
| Rayleigh | $\mathrm{Ray}(\sigma)$ | $\frac{x}{\sigma^2}e^{-x^2/(2\sigma^2)}$ | $[0,+\infty)$ | $\sigma > 0$ | $\sigma\sqrt{\pi/2}$ | $\frac{4-\pi}{2}\sigma^2$ |
| Pareto | $\mathrm{Par}(m,\alpha)$ | $\frac{\alpha m^\alpha}{x^{\alpha+1}}$ | $[m,+\infty)$ | $m > 0, \alpha > 0$ | $\frac{\alpha m}{\alpha-1}\ \dagger$ | $\frac{m^2\alpha}{(\alpha-1)^2(\alpha-2)}\ \ddagger$ |
| Beta | $\beta(a,b)$ | $\frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)}x^{a-1}(1-x)^{b-1}$ | $(0,1)$ | $a > 0, b > 0$ | $a/(a+b)$ | $\frac{ab}{(a+b)^2(a+b+1)}$ |
| Cauchy | $\mathrm{Cau}(x_0,\gamma)$ | $\frac{1}{\pi\gamma}\left[\frac{\gamma^2}{(x-x_0)^2+\gamma^2}\right]$ | $\mathbb{R}$ | $x_0 \in \mathbb{R}, \gamma > 0$ | no existe | no existe |

| Señal | $\mathcal{L}$ | ROC |
|---|---|---|
| $\delta(t)$ | $1$ | $\mathbb{C}$ |
| $u(t)$ | $\frac{1}{s}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} > 0\}$ |
| $-u(-t)$ | $\frac{1}{s}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} < 0\}$ |
| $\frac{t^{n-1}}{(n-1)!}u(t)$ | $\frac{1}{s^n}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} < 0\}$ |
| $e^{-\alpha t}u(t)$ | $\frac{1}{s+\alpha}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} > -\mathrm{Re}\{\alpha\}\}$ |
| $-e^{-\alpha t}u(-t)$ | $\frac{1}{s+\alpha}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} < -\mathrm{Re}\{\alpha\}\}$ |
| $\frac{t^{n-1}}{(n-1)!}e^{-\alpha t}u(t)$ | $\frac{1}{(s+\alpha)^n}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} > -\mathrm{Re}\{\alpha\}\}$ |
| $-\frac{t^{n-1}}{(n-1)!}e^{-\alpha t}u(-t)$ | $\frac{1}{(s+\alpha)^n}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} < -\mathrm{Re}\{\alpha\}\}$ |
| $\sin(\omega_0 t)u(t)$ | $\frac{\omega_0}{s^2+\omega_0^2}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} > 0\}$ |
| $\cos(\omega_0 t)u(t)$ | $\frac{s}{s^2+\omega_0^2}$ | $\{s \in \mathbb{C} : \mathrm{Re}\{s\} > 0\}$ |

# Desplazamiento Laplace

$$x(t-t_0) \xleftrightarrow{\mathcal{L}} e^{-st_0}X(s),\ \mathrm{ROC}\left\{e^{-st_0}X(s)\right\} = \mathrm{ROC}\left\{X(s)\right\}$$

$$x(t)e^{s_0 t} \xleftrightarrow{\mathcal{L}} X(s-s_0),\ \mathrm{ROC}\left\{X(s-s_0)\right\} = \mathrm{ROC}\left\{X(s)\right\} + \mathrm{Re}\left\{s_0\right\}$$

$$\mathcal{F}\left[\frac{dx(t)}{dt}\right] = j\omega X(j\omega) \qquad \mathcal{F}\left[\int_{-\infty}^{t} x(\tau)d\tau\right] = \frac{X(j\omega)}{j\omega}$$

$$\int_{-\infty}^{t} x(\tau)d\tau \xleftrightarrow{\mathcal{L}} \frac{X(s)}{s},\ \mathrm{ROC}\left\{\frac{X(s)}{s}\right\} \supseteq \mathrm{ROC}\left\{X(s)\right\} \cap \left\{s \in \mathbb{C} : \mathrm{Re}\{s\} > 0\right\}$$

$$\frac{dx(t)}{dt} \xleftrightarrow{\mathcal{L}} sX(s),\ \mathrm{ROC}\left\{sX(s)\right\} \supseteq \mathrm{ROC}\left\{X(s)\right\}$$

$$e^{-\alpha t}\,\mathrm{sen}(\omega t) \xrightarrow{L} \frac{\omega}{(s+\alpha)^2+\omega^2}$$

$$e^{-\alpha t}\cos(\omega t) \xrightarrow{L} \frac{s+\alpha}{(s+\alpha)^2+\omega^2}$$

**Serie geométrica**:

$$\sum_{n=0}^{\infty} \alpha^n = \frac{1}{1-\alpha}, \quad \alpha \in \mathbb{C}, \quad |\alpha| < 1$$

**Suma geométrica parcial**:

$$\sum_{n=N_1}^{N_2-1} \alpha^n = \frac{\alpha^{N_1} - \alpha^{N_2}}{1-\alpha}, \quad \alpha \in \mathbb{C},\ N_1, N_2 \in \mathbb{N}$$

- **Teoremas del valor inicial y final:** Sea $x(t)$ una señal que vale cero para $t < 0$ y que no tiene impulsos de ningún orden en el origen. Entonces valen los siguientes resultados:

$$x(0+) = \lim_{s\to\infty} sX(s)$$

Si $\lim_{t\to\infty} x(t)$ existe:

$$\lim_{t\to\infty} x(t) = \lim_{s\to 0} sX(s)$$

Convolución $x(t) * y(t) = \int_{-\infty}^{\infty} x(\tau)y(t-\tau)d\tau \qquad x[n] * y[n] = \sum_{k=-\infty}^{\infty} x[k]y[n-k]$

Lineal: $T\left[\alpha x(t) + b\,y(t)\right] = a\,T\left[x(t)\right] + b\,T\left[y(t)\right]$

Ti: $T\left[x(t-t_0)\right] = y(t-t_0)$ Memoria $\rightarrow h(t) = K\delta(t)$

Causal $\rightarrow h(t) = 0\ \forall t<0$

Estable $\rightarrow$ RoC o $\int |h(t)| < \infty$

Ec dif: $\sum_{k=0}^{N} a_k \frac{d^k y(t)}{dt^k} = \sum_{k=0}^{M} b_k \frac{d^k x(t)}{dt^k}$

Nyquist $f_{sample} > 2 f_{max}$

Relación entre transformadas

$$\underset{Z}{X(z)} \xrightarrow[z=e^{j\Omega}]{} \underset{\Omega}{X(\Omega)} \xrightarrow[\Omega=\frac{2\pi k}{N}]{} \underset{DFT}{X[k]}$$

$\mathcal{F}\left\{x[n-n_0]\right\} = e^{-j\Omega n_0} X(\Omega)$

$\mathcal{F}\left\{x(t-t_0)\right\} = e^{-j\omega t_0} X(\omega)$

$$\sum_{p=0}^{N} y[n-p]\alpha_p = \sum_{q=0}^{M} x[n-q]\beta_q$$

| | $\mathcal{F}$ | $\mathcal{F}^{-}$ |
|---|---|---|
| Cont | $X(j\omega) = \int_{-\infty}^{\infty} x(t)e^{-j\omega t}dt,\ \omega \in \mathbb{R}$ | $x(t) = \frac{1}{2\pi}\int_{-\infty}^{\infty} X(j\omega)e^{j\omega t}d\omega,\ t \in \mathbb{R}$ |
| dis | $X(e^{j\Omega}) = \sum_{n=-\infty}^{\infty} x[n]e^{-j\Omega n},\ \omega \in [-\pi, \pi)$ | $x[n] = \frac{1}{2\pi}\int_{-\pi}^{\pi} X(e^{j\omega})e^{j\Omega n}d\omega,\ n \in \mathbb{Z}$ |

Periódica en $2\pi$

$$H(z) = \frac{\sum_{q=0}^{M} z^{-q}\beta_q}{\sum_{p=0}^{N} z^{-p}\alpha_p} = \frac{\beta_0 + \beta_1 z^{-1} + \dots + \beta_n z^{-n}}{\alpha_1 + \alpha_2 z^{-1} + \dots + \alpha_n z^{-n}}$$

ceros

polos

| Señal | Transformada Z | ROC |
|---|---|---|
| $\delta[n]$ | $1$ | $\mathbb{C}$ |
| $u[n]$ | $\frac{1}{1-z^{-1}}$ | $\{z \in \mathbb{C} : \lvert z\rvert > 1\}$ |
| $-u[-n-1]$ | $\frac{1}{1-z^{-1}}$ | $\{z \in \mathbb{C} : \lvert z\rvert < 1\}$ |
| $\alpha^n u[n]$ | $\frac{1}{1-\alpha z^{-1}}$ | $\{z \in \mathbb{C} : \lvert z\rvert > \lvert\alpha\rvert\}$ |
| $-\alpha^n u[-n-1]$ | $\frac{1}{1-\alpha z^{-1}}$ | $\{z \in \mathbb{C} : \lvert z\rvert < \lvert\alpha\rvert\}$ |
| $n\alpha^n u[n]$ | $\frac{\alpha z^{-1}}{(1-\alpha z^{-1})^2}$ | $\{z \in \mathbb{C} : \lvert z\rvert > \lvert\alpha\rvert\}$ |
| $-n\alpha^n u[-n-1]$ | $\frac{\alpha z^{-1}}{(1-\alpha z^{-1})^2}$ | $\{z \in \mathbb{C} : \lvert z\rvert < \lvert\alpha\rvert\}$ |
| $r^n\cos(\omega_0 n)u[n],\ r > 0$ | $\frac{1-r\cos(\omega_0)z^{-1}}{1-2r\cos(\omega_0)z^{-1}+r^2z^{-2}}$ | $\{z \in \mathbb{C} : \lvert z\rvert > r\}$ |
| $r^n\sin(\omega_0 n)u[n],\ r > 0$ | $\frac{r\sin(\omega_0)z^{-1}}{1-2r\cos(\omega_0)z^{-1}+r^2z^{-2}}$ | $\{z \in \mathbb{C} : \lvert z\rvert > r\}$ |

$$x[n-n_0] \xleftrightarrow{Z} z^{-n_0}X(z) \qquad nx[n] \xleftrightarrow{Z} -z\frac{dX(z)}{dz}$$

Pivotes - * es parámetro desconocido

| Dist. | Parám. $\theta$ | Pivote $Q(\underline{X}^{(n)}, \theta)$ | Distribución de $Q$ |
|---|---|---|---|
| $\mathcal{N}(\mu, \sigma^2)$ | $\mu$ | $\frac{\overline{X}-\mu}{\sqrt{\sigma^2/n}}$ | $\mathcal{N}(0,1)$ |
| $\mathcal{N}(\mu, \sigma^{2*})$ | $\mu$ | $\frac{\overline{X}-\mu}{\sqrt{S^2/n}}$ | $t_{n-1}$ |
| $\mathcal{N}(\mu, \sigma^2)$ | $\sigma^2$ | $\frac{n\widehat{\sigma^2_{mv}}}{\sigma^2}$ | $\chi^2_n$ |
| $\mathcal{N}(\mu^*, \sigma^2)$ | $\sigma^2$ | $\frac{(n-1)S^2}{\sigma^2}$ | $\chi^2_{n-1}$ |
| $\mathcal{E}(\lambda)$ | $\lambda$ | $2n\bar{X}\lambda$ | $\chi^2_{2n}$ |
| $\mathcal{E}(\lambda)$ | $\lambda$ | $2nX_{min}\lambda$ | $\chi^2_2$ |
| $\text{Poi}(\mu)$ | $\mu$ | $\frac{\overline{X}-\mu}{\sqrt{\mu/n}}$ | $\mathcal{N}(0,1)^\dagger$ |
| $\text{Poi}(\mu)$ | $\mu$ | $\frac{\overline{X}-\mu}{\sqrt{\overline{X}/n}}$ | $\mathcal{N}(0,1)^\ddagger$ |
| $\text{Ber}(p)$ | $p$ | $\frac{\overline{X}-p}{\sqrt{p(1-p)/n}}$ | $\mathcal{N}(0,1)^\dagger$ |
| $\text{Ber}(p)$ | $p$ | $\frac{\overline{X}-p}{\sqrt{\overline{X}(1-\overline{X})/n}}$ | $\mathcal{N}(0,1)^\ddagger$ |
| $\mathcal{U}(0,\theta)$ | $\theta$ | $\frac{X_{max}}{\theta}$ | $q_\alpha = \alpha^n$ |
| $\mathcal{N}(\mu_i, \sigma_i^2)$ | $\Delta$ | $\frac{\bar{X}-\bar{Y}-\Delta}{\sqrt{\frac{\sigma_X^2}{m}+\frac{\sigma_Y^2}{n}}}$ | $\mathcal{N}(0,1)$ |
| $\mathcal{N}(\mu_i, \sigma_=^{2*})$ | $\Delta$ | $\frac{\bar{X}-\bar{Y}-\Delta}{\sqrt{S_P^2\left(\frac{1}{m}+\frac{1}{n}\right)}}$ | $t_{m+n-2}$ |
| $\mathcal{N}(\mu_i^*, \sigma_i^2)$ | $R$ | $\frac{1}{R}\frac{S_X^2}{S_Y^2}$ | $F_{m-1,n-1}$ |
| $\text{Ber}(\text{p}_\text{i})$ | $\Delta$ | $\frac{\bar{X}-\bar{Y}-\Delta}{\sqrt{\frac{\bar{X}(1-\bar{X})}{m}+\frac{\bar{Y}(1-\bar{Y})}{n}}}$ | $\mathcal{N}(0,1)^\ddagger$ |

| Señal | Transformada de Fourier | Serie de Fourier |
|---|---|---|
| $\delta(t)$ | $1$ | |
| $e^{j\omega_0 t}$ | $2\pi\delta(\omega-\omega_0)$ | $a_1=1$<br>$a_k=0 \quad \forall k\neq 1$ |
| $\cos(\omega_0 t)$ | $\pi\left[\delta(\omega-\omega_0)+\delta(\omega+\omega_0)\right]$ | $a_1=a_{-1}=\frac{1}{2}$<br>$a_k=0 \quad \forall k\neq 1$ |
| $\sin(\omega_0 t)$ | $\frac{\pi}{j}\left[\delta(\omega-\omega_0)-\delta(\omega+\omega_0)\right]$ | $a_1=-a_{-1}=\frac{1}{2j}$<br>$a_k=0 \quad \forall k\neq 1$ |
| $1$ | $2\pi\delta(\omega)$ | $a_0=1$<br>$a_k=0 \quad \forall k\neq 0$ |
| $\sum_{n=-\infty}^{\infty}\delta(t-nT)$ | $\frac{2\pi}{T}\sum_{n=-\infty}^{\infty}\delta\left(\omega-\frac{2\pi n}{T}\right)$ | $a_k=\frac{1}{T}, \quad \forall k$ |
| $\sum_{k=-\infty}^{\infty}a_k e^{jk\omega_0 t}$ | $2\pi\sum_{k=-\infty}^{\infty}a_k\delta(\omega-k\omega_0)$ | $a_k$ |
| $u(t+T_1)-u(t-T_1)$ | $\frac{2\sin(\omega T_1)}{\omega}$ | |
| $x(t)=u(t+T_1)-u(t-T_1)$<br>$x(t+T)=x(t)$ | $\sum_{k=-\infty}^{\infty}\frac{2\sin(k\omega_0 T_1)}{k}\delta(\omega-k\omega_0)$ | $\frac{\sin(k\omega_0 T_1)}{k\pi}$ |
| $\frac{\sin(Wt)}{\pi t}$ | $u(\omega+W)-u(\omega-W)$ | |
| $u(t)$ | $\frac{1}{j\omega}+\pi\delta(\omega)$ | |
| $e^{-\alpha t}u(t), \mathrm{Re}(\alpha)>0$ | $\frac{1}{\alpha+j\omega}$ | |
| $\frac{t^{n-1}}{(n-1)!}e^{-\alpha t}u(t), \mathrm{Re}(\alpha)>0$ | $\frac{1}{(\alpha+j\omega)^n}$ | |
| $\frac{1}{\sqrt{2\pi}\sigma}e^{-\frac{t^2}{2\sigma^2}}$ | $e^{-\frac{\omega^2\sigma^2}{2}}$ | |

| Señal | Transformada de Fourier | Coeficientes de la serie de Fourier |
|---|---|---|
| $\delta[n]$ | $1$ | |
| $e^{j\omega_0 n}$ | $2\pi\sum_{l=-\infty}^{\infty}\delta(\omega-\omega_0-2\pi l)$ | Si $w_0=\frac{2\pi m}{N}$<br>$a_k=\begin{cases}1 & k=m, m\pm N, m\pm 2N, ... \\ 0 \text{ en otro caso}\end{cases}$ |
| $\cos(\omega_0 n)$ | $\pi\sum_{l=-\infty}^{\infty}[\delta(\omega-\omega_0-2\pi l)+\delta(\omega+\omega_0-2\pi l)]$ | Si $w_0=\frac{2\pi m}{N}$<br>$a_k=\begin{cases}\frac{1}{2} & k=\pm m, \pm m\pm N, \pm m\pm 2N, ... \\ 0 \text{ en otro caso}\end{cases}$ |
| $\sin(\omega_0 n)$ | $\frac{\pi}{j}\sum_{l=-\infty}^{\infty}[\delta(\omega-\omega_0-2\pi l)-\delta(\omega+\omega_0-2\pi l)]$ | Si $w_0=\frac{2\pi m}{N}$<br>$a_k=\begin{cases}\frac{1}{2j} & k=m, m\pm N, m\pm 2N, ... \\ -\frac{1}{2j} & k=-m, -m\pm N, -m\pm 2N, ... \\ 0 \text{ en otro caso}\end{cases}$ |
| $1$ | $2\pi\sum_{l=-\infty}^{\infty}\delta(\omega-2\pi l)$ | $a_k=\begin{cases}1 & k=0, \pm N, \pm 2N, ... \\ 0 \text{ en otro caso}\end{cases}$ |
| $\sum_{k=-\infty}^{\infty}\delta[n-kN]$ | $\frac{2\pi}{N}\sum_{k=-\infty}^{\infty}\delta\left(\omega-\frac{2\pi k}{N}\right)$ | $a_k=\frac{1}{N} \quad \forall k$ |
| $\sum_{k=\langle N\rangle}a_k e^{j\frac{2\pi k}{N}n}$ | $2\pi\sum_{k=-\infty}^{\infty}a_k\delta(\omega-\frac{2\pi k}{N})$ | $a_k$ |
| $u[n]-u[n-N]$ | $e^{-j\omega\frac{(N-1)}{2}}\frac{\sin(\omega N/2)}{\sin(\omega/2)}$<br>periódica con periodo $2\pi$ | |
| $x[n]=u[n+N_1]-u[n-N_1-1]$<br>$x[n]=x[n+N]$ | $2\pi\sum_{k=-\infty}^{\infty}\delta\left(\omega-\frac{2\pi k}{N}\right)$ | $a_k=\frac{\sin\left(\frac{2\pi k}{N}\left(N_1+\frac{1}{2}\right)\right)}{N\sin(\frac{2\pi k}{2N})} \quad k\neq 0, \pm N, \pm 2N, ...$<br>$a_k=\frac{2N_1+}{N} \quad k=0, \pm N, \pm 2N, ...$ |
| $\frac{\sin(Wn)}{\pi n},\ 0<W<\pi$ | $u(\omega+W)-u(\omega-W)$<br>periódica con periodo $2\pi$ | |
| $u[n]$ | $\frac{1}{1-e^{-j\omega}}+\pi\delta(\omega)$<br>periódica con periodo $2\pi$ | |
| $\alpha^n u[n], \|\alpha\|<1$ | $\frac{1}{1-\alpha e^{-j\omega}}$<br>periódica con periodo $2\pi$ | |
| $\frac{(n+r-1)!}{n!(r-1)!}\alpha^n u[n], \|\alpha\|<1$ | $\frac{1}{(1-\alpha e^{-j\omega})^r}$<br>periódica con periodo $2\pi$ | |