$$y\left(t\right)=\underbrace{f\left[\omega\left(y\left(t\right)\right)\right]}_{\text{CONJUNTO DE INFORMACIÓN}}+\underbrace{\varepsilon\left(t\right)}_{\text{ALEATORIEDAD}}$$

$\underbrace{\text{TC}}_{\text{TIPO DE CAMBIO}}$

CONJUNTO DE INFORMACIÓN

ALEATORIEDAD

VARIABLE ALEATORIA

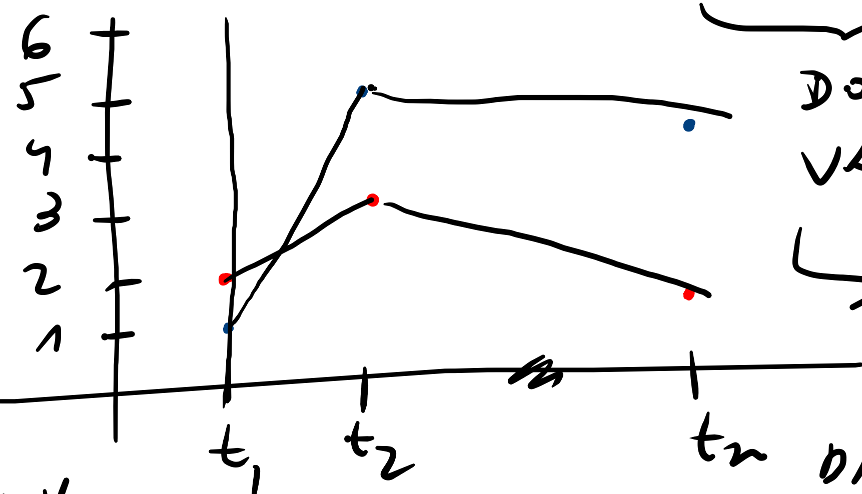
PROCESO ESTOCÁSTICO

$Y(t, \omega)$ → VARIABLES (ESTADOS) → DISCRETOS / CONTINUAS

DOS VARIABLES

→ t : TIEMPO → DISCRETO / CONTINUO

RESULTADOS TIRADA DADO



$Y(\omega) \to$ VA

$Y(t) \to$ TIEMPO DÍA

PROCESO MARKOV $\rightarrow$ AR(1)

TIEMPO DISCRETO $\rightarrow$ CADENA DE MARKOV

$$
\begin{array}{c|c}
 & \begin{array}{ccc} S & I & R \end{array} \\
\begin{array}{c} S \\ I \\ R \end{array} & \begin{pmatrix} 0{,}70 & 0{,}15 & 0{,}15 \\ & & \\ & & \end{pmatrix}
\end{array}
\rightarrow \underline{\Sigma = 1}
$$

$\omega(y(t)) = \{ y(t-j) \}$

OTRAS VARIABLES

$TC_t = f(\underbrace{TC_{t-1};\ TC_{t-2};\ \cdots}_{})$

TINGA 0120 $\rightarrow$ AR(0)

(NO TIENE MEMORIA)

AUTORREGRESIVIDAD

$\rightarrow$ MEMORIA $\leftarrow$

DESCOMPOSICIÓN **ADITIVA**

$$Y(t) = \underbrace{C(t)}_{\text{ciclo}} + \underbrace{T(t)}_{\text{tendencia}} + \underbrace{S(t)}_{\text{estacionalidad}} + \underbrace{E(t)}_{\text{ruido}}$$

MULTIPLICATIVA

$$Y(t) = C(t) * T(t) * S(t) * E(t)$$

AR(0) $\longrightarrow$ $\underbrace{\text{SIN MEMORIA}}_{\text{INDEPENDENCIA}}$

IID

ESTACIONALIDAD $\longrightarrow$ COMPONENTE SERIE

$\neq$

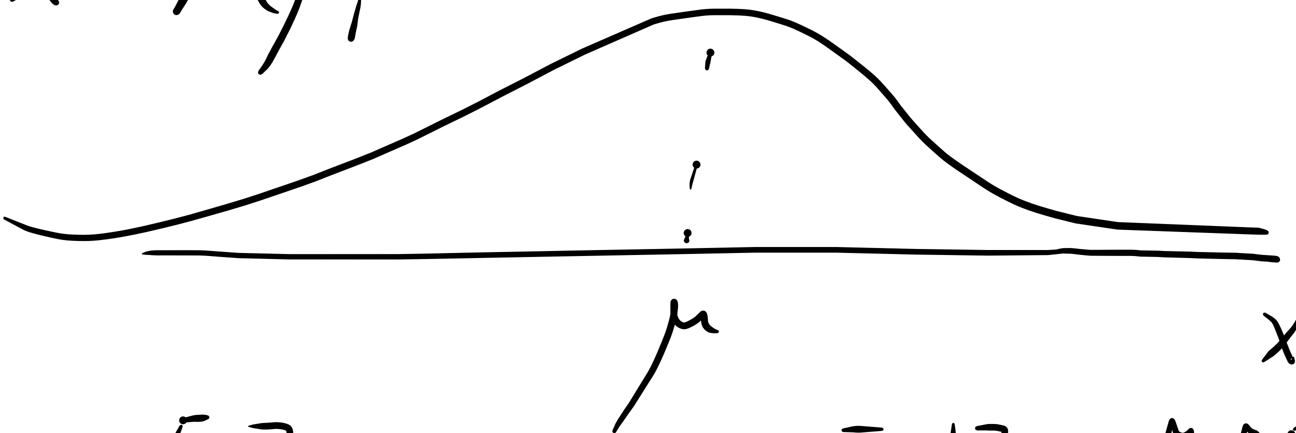
ESTACIONARIEDAD

ESTRICTA

DÉBIL

SEMIT

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



$E[X] = \mu$

$$\underbrace{Var[X] = \sigma^2}$$

$E[X^k] \to$ MOMENTO ABSOLUTO

$k=1 \to E[X]$

$k=2 \to E[X^2]$

$$Var[X] = E[X^2] - E^2[X]$$

$$Var[X] = E[(\underbrace{X - E(X)}_{})^2]$$

→ MOMENTO CENTRADO DE ORDEN 2

$$AS(X) \longrightarrow = \frac{mc_3}{\sigma^3}$$

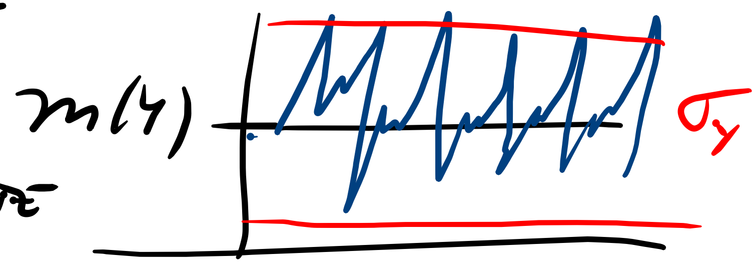
NORMAL

$$K(X) = \frac{mc_4}{\sigma^4} - 3$$

ESTACIONARIA DE SEGUNDO ORDEN

$E[Y(t)]$ CONSTANTE

$\sigma^2[Y(t)]$ CONSTANTE



PARADOJA DE SAN PETERSBURGO

$E[X] = \infty$

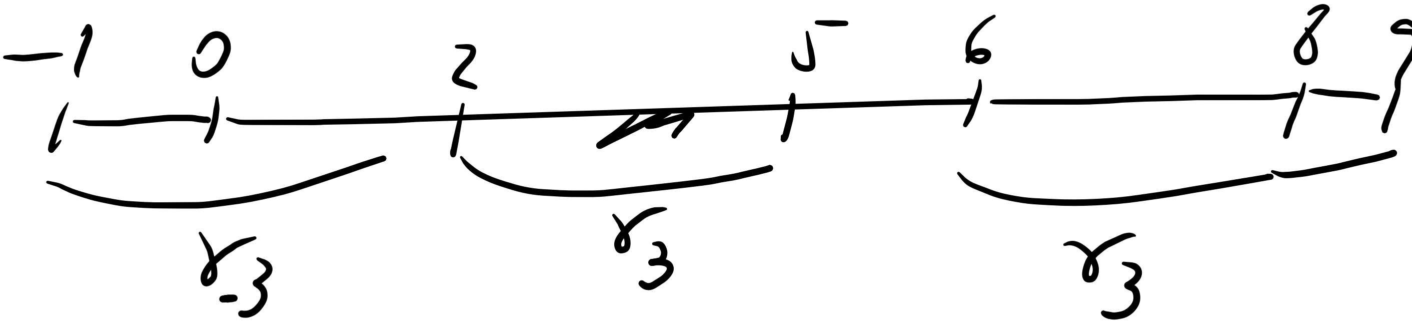
(i) $m_1(Y_t) = m_1(Y) = m(Y)$

(ii) $E\left(Y_t^{\,2}\right) < \infty$

(iii) $\underbrace{\gamma(Y_{t-j}; Y_t) = \gamma_j(Y)}_{} = \gamma_{-j}(Y)$ $(j = 0, \pm 1, \pm 2, \ldots)$

γ

$\overline{\mathrm{cov}(Y_{t-j}; Y_t)}$ AUTOCOVARIANZA DI ORDINE j



FUNCIÓN DE AUTOCOVARIANZAS

→ MEDIA

$$\gamma_j(Y) = E[(y_t - m(Y))(y_{t-j} - m(Y))] \quad (j = 0, 1, 2, \ldots)$$

$$\operatorname{cov}(x;y) = E[(X - E(X))(Y - E(Y))]$$

MOMENTO CENTRADO DE ORDEN MIXTO

$$\operatorname{cov}(x;y) = E[XY] - E[X] . E[Y]$$

Si $X \perp Y$ (INDEPENDIENTES) $E[X.Y] = E[X]E[Y]$

$$\Rightarrow \operatorname{cov}(x;y) = 0$$

INDEPENDENCIA $\Rightarrow$ INCORRELACIÓN

$$\rho(x;y) = \frac{\overbrace{\operatorname{COV}(x;y)}^{0}}{\sigma_X \cdot \sigma_Y}$$

$$\text{si } \operatorname{COV}(x;y) = 0 \Rightarrow \rho(x;y) = 0$$

$$\gamma_0(Y) = E\left[(y_t - m(Y))(y_t - m(Y))\right] = E\left[\underbrace{(y_t - m(Y))^2}\right] = \sigma_Y^2$$

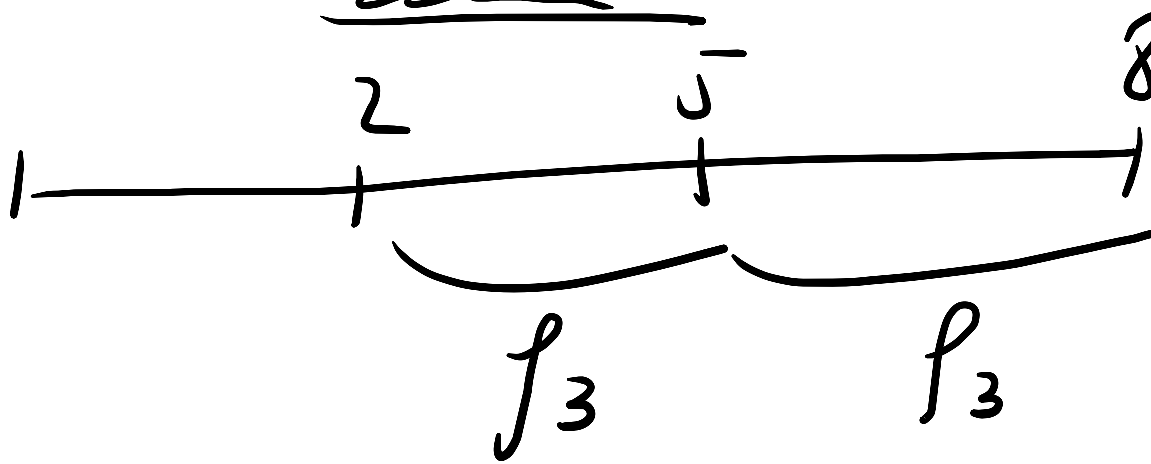
✓ AUTOCOVARIANZA DE ORDEN CERO

$$E\left[(X - E(X))^2\right] = \sigma_X^2$$

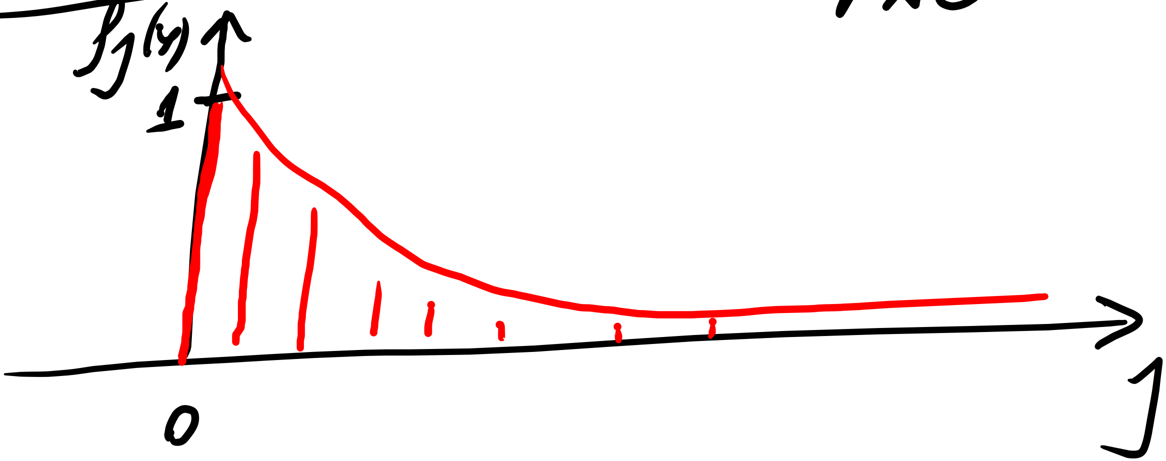
$$\rho_j\,(Y) = \frac{\gamma_j(Y)}{\gamma_0(Y)} \qquad (j = 0, 1, 2, \ldots)$$

Donde se cumple que $|\rho_j\,(Y)| \leq 1$

Se verifica que si $j = 0 \Rightarrow \rho_0\,(Y) = 1$



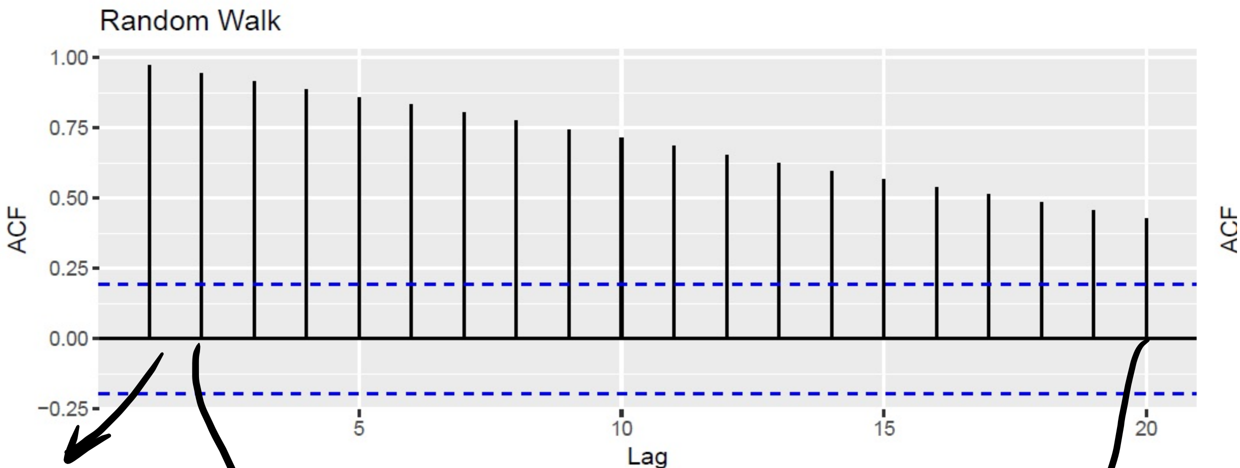
CORRELOGRAMA $\rightarrow$ GRÁFICO DE LA FAC



$$\rho_0(y) = \frac{\gamma_0(y)}{\gamma_0(y)} = 1$$

$$|\rho_j(y)| \leq 1$$

$$-1 \leq \rho_j(y) \leq 1$$



$$\rho_0 = \frac{\gamma_0}{\gamma_0} \qquad \rho_1 = \frac{\gamma_1}{\gamma_0} \qquad \rho_{20} = \frac{\gamma_{20}}{\gamma_0}$$

$$Y_t = C_t + \underbrace{T_t + S_t}_{} + \varepsilon_t$$

ARIMA(p, q)

NO ESTACIONARIEDAD

SARIMA(p, d, q)

$$\hat{Y}_t = Y_t - \hat{T}_t$$

$$\hat{T}_t = \hat{\alpha} + \hat{\beta} t \quad \text{MCO}$$

$$Y_t = Y_{t-1} + \varepsilon_t$$

RANDOM WALK (AR(1))

$$\underbrace{Y_t - Y_{t-1}} = \varepsilon_t$$

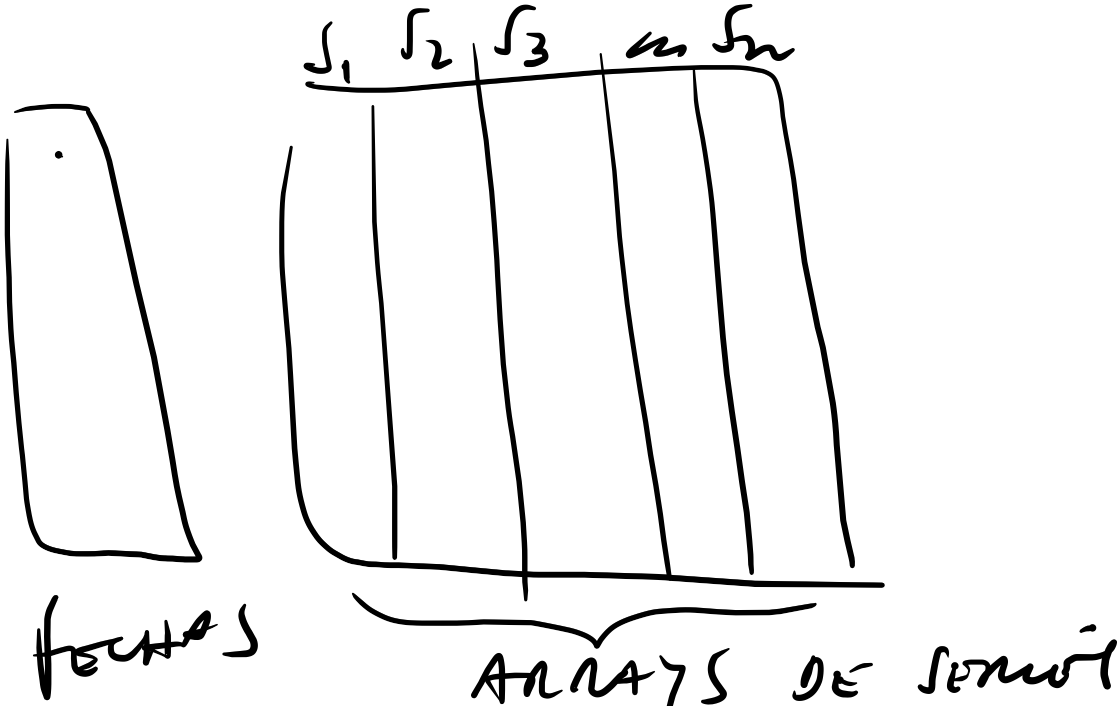
RUIDO BLANCO

$$\nabla Y_t = \varepsilon_t$$

RUIDO BLANCO

$$E(\nabla Y_t) = E(\varepsilon_t) = 0$$

$$Var(\nabla Y_t) = Var(\varepsilon_t) = \sigma^2_\varepsilon$$



AS.XTS(ARRAY/VECTOR,
ORDER.BY=FECHAS)

$$Y_t - Y_{t-12} = \underbrace{\nabla_{12} Y_t}$$

NABLA

∇

$$\nabla Y_t = \underline{Y_t} - Y_{t-1}$$

DELTA

$$\Delta Y_t = Y_{t+1} - Y_t$$

$$\nabla \nabla_{12} Y_t = \underbrace{\nabla_{12} Y_t - \nabla_{12} Y_{t-1}}$$

12 | 216 | 100

08/2021 410

09/2021 433

Inflación

$$\frac{433}{410} - 1 = \%$$