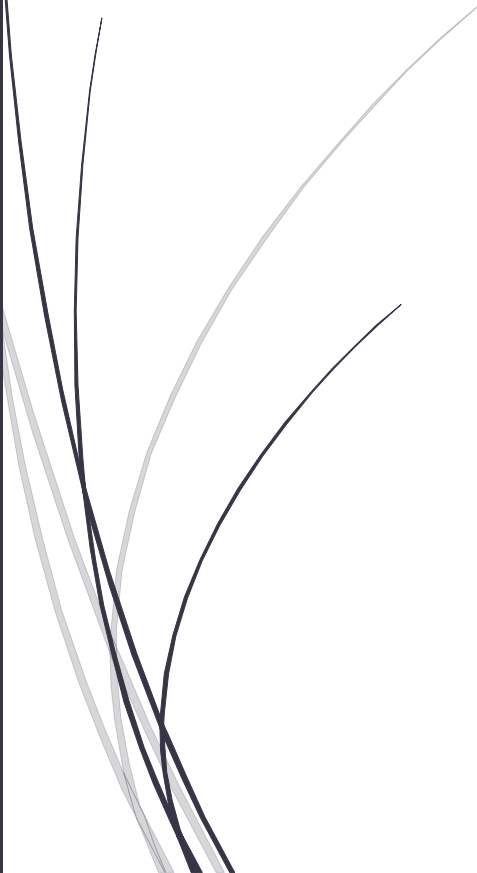


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1-3-2021

# Evidencia 1.3

Martínez Coronel Brayan Yosafat



$$a_n = \frac{2}{T} \int_{t_0}^{t_0+T} f(t) \cos(n\omega_0 t) dt$$

$$b_n = \frac{2}{T} \int_{t_0}^{t_0+T} f(t) \sin(n\omega_0 t) dt$$

$$a_0 = \frac{1}{T} \int_{t_0}^{t_0+T} f(t) dt$$

$$f(t) = \begin{cases} \cos t & -\frac{\pi}{2} < t < \frac{\pi}{2} \\ 0 & \text{en otro caso} \end{cases}$$

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Gosafet

STF de  $-\pi < t < \pi$  es:  $a_0 + \sum_{n=1}^{\infty} a_n \cos n\omega_0 t + b_n \sin n\omega_0 t$ ,  $\omega_0 = \frac{2\pi}{2\pi}$

$$a_0 = \frac{1}{T} \int_{-\pi}^{\pi} f(t) dt = 0 + \int_{-\pi/2}^{\pi/2} \frac{\cos t}{2\pi} dt + 0 = \frac{\sin \frac{\pi}{2} - \sin \frac{-\pi}{2}}{2\pi} = \frac{2}{2\pi} = \frac{1}{\pi}$$

$$\begin{aligned} a_n &= \frac{1}{\pi} \int_{-\pi}^{\pi} f(t) \cos n\omega_0 t dt = \frac{1}{\pi} \int_{-\pi/2}^{\pi/2} \cos t \cos n\omega_0 t dt = \frac{1}{2\pi} \int_{-\pi/2}^{\pi/2} \cos(n\omega_0 + 1)t + \cos(n\omega_0 - 1)t dt \\ &= \frac{1}{2\pi} \left[ \frac{\sin(n\omega_0 + 1)t}{n\omega_0 + 1} + \frac{\sin(n\omega_0 - 1)t}{n\omega_0 - 1} \right]_{-\pi/2}^{\pi/2} = \frac{1}{2\pi} \left[ \frac{\sin(\frac{\pi}{2}(n+1))}{n+1} + \frac{\sin(\frac{\pi}{2}(n-1))}{n-1} \right] \\ &= \frac{1}{2\pi} \left[ \frac{\sin \frac{\pi}{2}(n+1)}{n+1} + \frac{\sin \frac{\pi}{2}(n-1)}{n-1} - \frac{\sin \frac{-\pi}{2}(n+1)}{n+1} - \frac{\sin \frac{-\pi}{2}(n-1)}{n-1} \right] \quad \sin -\alpha = -\sin \alpha \\ &= \frac{1}{2\pi} \left[ \frac{1}{n+1} \left( \sin \left( \frac{(n+1)\pi}{2} \right) - \sin \left( \frac{-(n+1)\pi}{2} \right) \right) + \frac{1}{n-1} \left( \sin \left( \frac{(n-1)\pi}{2} \right) - \sin \left( \frac{-(n-1)\pi}{2} \right) \right) \right] \end{aligned}$$

$b_n = 0$ ,  $f(t)$  es par

Se indetermina

$$\lim_{n \rightarrow 1} a_n = \frac{1}{2\pi} \left\{ \frac{1}{2} [0-0] + \frac{1}{0} [0-0] \right\} = \frac{0}{0} \quad \text{por L'Hopital para } (2)$$

$$= \frac{1}{2\pi} \left\{ \frac{\frac{\pi}{2} \cos \frac{(n-1)\pi}{2} - \frac{-\pi}{2} \cos \frac{-(n-1)\pi}{2}}{-1} \right\} = \frac{1}{2} \left( \frac{1}{2} + \frac{1}{2} \right) = \frac{1}{2}$$

$$f(t) = \frac{1}{\pi} + \frac{\cos t}{2} + \frac{1}{2\pi} \sum_{n=2}^{\infty} \left\{ \frac{\sin \frac{(n+1)\pi}{2} - \sin \frac{-(n+1)\pi}{2}}{n+1} + \frac{\sin \frac{(n-1)\pi}{2} - \sin \frac{-(n-1)\pi}{2}}{n-1} \right\} \cos nt$$

Con  $n = 1000$

