

A thick dark blue vertical bar runs down the left side of the page. A blue arrow-shaped banner points to the right from this bar, containing the date. In the bottom left corner, several thin, curved lines in dark blue and light grey sweep upwards and to the right.

12-4-2021

Evidencia 1.9

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$$F(\omega) = 2\pi \sum_{-\infty}^{\infty} C_n \delta(\omega - n\omega_0) \quad \omega_0 = \frac{2\pi}{T} = \frac{1}{2}$$

$$C_n = \frac{2}{T} \int_0^{1/2} e^{-t} e^{-in\omega_0 t} dt = 2 \int_0^{1/2} e^{-t(1+in\omega_0)} dt$$

$$= \frac{2e^{-t(1+in\omega_0)}}{-(1+in\omega_0)} \Big|_0^{1/2} = \frac{2e^{-\frac{1+in\omega_0}{2}} - 2}{-(1+in\omega_0)}$$

$$= \frac{2e^{-\frac{1}{2}} (\cos 2n\pi + i \sin 2n\pi) - 2}{-(1+in4\pi)}$$

$$= \frac{-2(e^{-\frac{1}{2}} - 1)}{1+4n\pi i} = \frac{-2(e^{-\frac{1}{2}} - 1)(1-4n\pi i)}{1+16n^2\pi^2}$$

$$C_n = \frac{-2(e^{-\frac{1}{2}} - 1)}{1+16n^2\pi^2} + i \frac{8n\pi(e^{-\frac{1}{2}} - 1)}{1+16n^2\pi^2}$$

$$|C_n| = \left| \frac{e^{-\frac{1}{2}} - 1}{1+16n^2\pi^2} \right| \sqrt{(-2)^2 + (8n\pi)^2}$$

$$= \left| \frac{e^{-1/2} - 1}{1+16n^2\pi^2} \right| \sqrt{4 + 64n^2\pi^2}$$

n	C _n
0	0.78
±1	0.062
±2	0.031
±3	0.020
±4	0.015
±5	0.012

