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Trabalho 12 - CIV

$$f(t) = \begin{cases} 0 & , t < -7 \text{ e } t > 7 \\ 6 & , -7 \leq t < 0 \\ -6 & , 0 \leq t < 7 \end{cases}$$

- Pelo teorema, a transformada de Fourier pode ser dada como:

$$\mathcal{F}_f = \int_{-\infty}^{\infty} f(t)\, e^{-2\pi i n t}\, dt$$

$$\mathcal{F}_f = \int_{-7}^{0} 6\, e^{-2\pi i n t}\, dt - \int_{0}^{7} 6\, e^{-2\pi i n t}\, dt \Rightarrow \left[\frac{-6}{2\pi i n} e^{-2\pi i n t}\right]_{-7}^{0} + \ldots$$

$$\ldots + \left[\frac{6}{2\pi i n} e^{-2\pi i n t}\right]_{0}^{7} \Rightarrow \left[\frac{-3}{\pi i n} e^{-2\pi i n t}\right]_{-7}^{0} + \left[\frac{3}{\pi i n} e^{-2\pi i n t}\right]_{0}^{7}$$

$$\Rightarrow \left[\frac{-3e^{0}}{\pi i n} - \left(\frac{-3e^{-2\pi i n(-7)}}{\pi i n}\right)\right] + \left[\frac{3\, e^{-2\pi i n(7)}}{\pi i n} - \frac{3\, e^{0}}{\pi i n}\right]$$

$$\Rightarrow \frac{-3}{\pi i n}\left(1 - e^{14\pi i n}\right) + \frac{3}{\pi i n}\left(e^{-14\pi i n} - 1\right)$$

$$\Rightarrow \frac{-3}{\pi i n} + \frac{3e^{14\pi i n}}{\pi i n} + \frac{3e^{-14\pi i n}}{\pi i n} - \frac{3}{\pi i n}$$

$$\mathcal{F}_f = \frac{-6}{\pi i n} + \frac{3}{\pi i n}\left(e^{-14\pi i n} + e^{14\pi i n}\right)$$

$$\Rightarrow \frac{-6}{\pi i n} + \frac{3}{\pi i n}\left(\cos(14\pi n) - i\sin(14\pi n) + \cos(14\pi n) + i\sin(14\pi n)\right)$$

$$\Rightarrow \frac{-6}{\pi i n} + \frac{6\cos(14\pi n)}{\pi i n}$$

$$\therefore \mathcal{F}_f = \frac{-6}{\pi i n} + \frac{6\cos(14\pi n)}{\pi i n} \quad //$$