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Participación 1.1

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Recorremos el intervalo a $-2<t<2$, con $A=1$

$x(t) = t+1$ en $1\leq t\leq 0$; $1-t$ en $0\leq t\leq 1$; 0 en otro caso

$$a_0 = \frac{1}{4}\int_{-2}^{2} x(t)\,dt = \frac{1}{4}\int_{-1}^{0}(t+1)\,dt + \frac{1}{4}\int_{0}^{1}(1-t)\,dt \qquad \omega = \frac{2\pi}{4} = \frac{\pi}{2}$$

$$= \frac{1}{4}\left[\frac{t^2}{2}+t\right]_{-1}^{0} + \frac{1}{4}\left[t-\frac{t^2}{2}\right]_{0}^{1} = \frac{1}{4}\left[\frac{1}{2}\right] + \frac{1}{4}\left(\frac{1}{2}\right) = \frac{1}{4}$$

$\cos -A = \cos A$

$$a_n = \frac{1}{2}\int_{-1}^{0}(t+1)\cos\left(\frac{n\pi t}{2}\right)dt + \frac{1}{2}\int_{0}^{1}(1-t)\cos\left(\frac{n\pi t}{2}\right)dt$$

$$= \frac{1}{2}\,sen\left(\frac{n\pi t}{2}\right)\Big|_{-1}^{0} + \frac{1}{2}\,sen\left(\frac{n\pi t}{2}\right)\Big|_{0}^{1} + \frac{1}{2}\int_{-1}^{0} t\cos\left(\frac{n\pi t}{2}\right)dt - \frac{1}{2}\int_{0}^{1} t\cos\left(\frac{n\pi t}{2}\right)dt$$

$$= \cancel{\frac{1}{2}\,sen\left(\frac{-n\pi}{2}\right)} + \cancel{\frac{1}{2}\,sen\left(\frac{n\pi}{2}\right)} + \frac{1}{2}\int_{-1}^{0} t\cos\frac{n\pi t}{2}\,dt - \frac{1}{2}\int_{0}^{1} t\cos\frac{-n\pi t}{2}\,dt$$

$$\boxed{\int x\cos(ax)\,dx = \frac{\cos ax}{a^2} + \frac{x\,sen\,ax}{a}} \qquad a = \frac{n\pi}{2}$$

$$= \frac{1}{2}\left[\frac{4\cos\left(\frac{n\pi}{2}t\right)}{n^2\pi^2} + \frac{2t\,sen\,\frac{n\pi}{2}t}{n\pi}\right]_{-1}^{0} - \frac{1}{2}\left[\frac{4\cos\left(\frac{n\pi}{2}t\right)}{n^2\pi^2} + \frac{2t\,sen\left(\frac{n\pi t}{2}\right)}{n\pi}\right]_{0}^{1}$$

$$= \frac{1}{2}\left[\frac{4}{n^2\pi^2} - \left(\frac{4\cos\frac{n\pi}{2}}{n^2\pi^2} + \frac{2\,sen\,\frac{n\pi}{2}}{n\pi}\right)\right] - \frac{1}{2}\left[\frac{4\cos\frac{n\pi}{2}}{n^2\pi^2} + \frac{2\,sen\,\frac{n\pi}{2}}{n\pi} - \left(\frac{4}{n^2\pi^2}\right)\right]$$

$$= \frac{4}{n^2\pi^2} - \frac{1}{2}\left(\frac{4\cos\frac{n\pi}{2}}{n^2\pi^2} - \cancel{\frac{2\,sen\,\frac{n\pi}{2}}{n\pi}}\right) - \frac{1}{2}\left(\frac{4\cos\frac{n\pi}{2}}{n^2\pi^2} + \cancel{\frac{2\,sen\,\frac{n\pi}{2}}{n\pi}}\right)$$

$$= \frac{4}{n^2\pi^2}\left(1-\cos\frac{n\pi}{2}\right)$$

$x(t)$ es simétrica en $y \Rightarrow b_n = 0$

$$x(t) = \frac{1}{4} + \sum_{n=1}^{\infty}\frac{4}{n^2\pi^2}\left(1-\cos\frac{n\pi}{2}\right)\cos\left(\frac{n\pi}{2}t\right) \quad \text{en } -6<t<-2$$

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$$f(t) = \frac{1}{4} + \sum_{n=1}^{100}\frac{4}{n^2\pi^2}\left(1-\cos\left(\frac{n\pi}{2}\right)\right)$$

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