INSTITUTO POLITÉCNICO NACIONAL

ESCUELA SUPERIOR DE CÓMPUTO

Serie Trigonométrica de Fourier

Participación 1.2

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Asignatura:

Teoría de Comunicaciones y Señales

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Grupo:

3CV17

Fecha:

02/10/2021

$$bn = \frac{4}{T}\int_{\emptyset}^{2\pi} x(t)\, sen(n\, w_0 t)\, dt$$

$$bn = \frac{4}{4\pi}\int_{\emptyset}^{2\pi} x(t)\, sen\left(\frac{nt}{2}\right) dt = \frac{1}{\pi}\int_{\emptyset}^{\pi} A\, sen(t)\cdot sen\left(\frac{nt}{2}\right) dt + \emptyset$$

$$bn = \frac{A}{\pi}\int_{\emptyset}^{\pi} sen(t)\, sen\left(\frac{nt}{2}\right) dt$$

$$bn = \frac{A}{\pi}\int_{0}^{\pi} \frac{1}{2}\cos(A-B) - \cos(A+B)\, dt$$

$$x = t - \frac{nt}{2}$$

$$x' = t + \frac{nt}{2}$$

$$bn = \frac{A}{\pi}\,\frac{1}{2}\int_{0}^{\pi} \cos\left(t - \frac{nt}{2}\right) - \int_{0}^{\pi}\cos\left(t + \frac{nt}{2}\right) dt$$

$$bn = \frac{A}{2\pi}\left[\int_{0}^{\pi} \frac{2\cos(x)}{2-n}\, dx - \int_{0}^{\pi}\frac{2\cos(x')}{2+n}\, dx\right]$$

$$bn = \frac{A}{2\pi}\left[\frac{2}{2-n}\int_{0}^{\pi}\cos(x)\, dx - \frac{2}{2+n}\int_{0}^{\pi}\cos(x')\, dx\right]$$

$$bn = \frac{A}{2\pi}\left[\frac{2}{2-n}\left(sen(x)\right)\Big|_{0}^{\pi} - \frac{2}{2+n}\left(sen(x')\right)\Big|_{0}^{\pi}\right]$$

Sustituyendo

$$bn = \frac{A}{2\pi}\left[\frac{2}{2-n}\left(sen\left(t - \frac{nt}{2}\right)\right)\Big|_{\emptyset}^{\pi} - \frac{2}{2+n}\left(sen\left(t + \frac{nt}{2}\right)\right)\Big|_{\emptyset}^{\pi}\right]$$

$$bn = \frac{A}{2\pi}\left[\left(\frac{2sen\left(t - \frac{nt}{2}\right)}{2-n}\right)\Big|_{\emptyset}^{\pi} - \left(\frac{2sen\left(t + \frac{nt}{2}\right)}{2+n}\right)\Big|_{\emptyset}^{\pi}\right]$$

$$bn = \frac{A}{2\pi}\left[\left(\frac{2sen\left(\pi - \frac{\pi n}{2}\right)}{2-n}\right) - \frac{2sen\left(0 - \frac{n\emptyset}{2}\right)}{2-n}\right] - \left(\frac{2sen\left(t + \frac{nt}{2}\right)}{2+n}\right)\Big|_{0}^{\pi}$$

$$bn = \frac{A}{2\pi}\left[\left(\frac{2sen\left(\pi - \frac{\pi n}{2}\right)}{2-n}\right) - \left(\frac{2sen\left(\pi + \frac{\pi n}{2}\right)}{2+n} - \frac{2sen\left(0 + \frac{0}{2}\right)}{2+n}\right)\right]$$

$$bn = \frac{A}{2\pi}\left[\left(\frac{2sen\left(\pi - \frac{\pi n}{2}\right)}{2-n}\right) - \left(\frac{2sen\left(\pi + \frac{\pi n}{2}\right)}{2+n}\right)\right]$$

$$bn = \frac{A}{\pi}\left[\frac{sen(\pi - \frac{\pi n}{2})}{2-n} - \frac{sen(\pi + \frac{\pi n}{2})}{2+n}\right]$$

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

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

$$bn = \frac{A}{\pi}\left[\frac{sen(\frac{\pi n}{2})(2+n \cdot 2-n)}{4-n^2}\right] = \frac{A}{\pi}\left[\frac{sen(\frac{\pi n}{2})(2+n+2-n)}{4-n^2}\right]$$

$$bn = \frac{A}{\pi}\left[\frac{4 sen(\frac{\pi n}{2})}{4-n^2}\right] = \frac{4A\, sen(\frac{\pi n}{2})}{\pi(4-n^2)} \quad , n \neq 2$$

$$f(t\ \pi) = \sum_{n=1}^{\infty} \frac{4A sen \frac{n\pi}{2}}{\pi(4-n^2)} sen\left(\frac{n}{2}t\right) + b_2\, sen(t)$$

$$b_2 = \frac{4}{T}\int_0^{T/2} f(t)\, sen(2 W_0 t)\, dt$$

$$b_2 = \frac{4}{\pi}\int_0^{2\pi} (A\, sen t)(sen(t))\, dt = \frac{A}{\pi}\int_0^{2\pi} sen^2(t)\, dt$$

$$b_2 = \frac{A}{2\pi}\int_0^{\pi}\left[\frac{1}{2} - \frac{1}{2}\cos(2t)\right] dt = \frac{A}{\pi}\left\{\frac{1}{2}[\pi] - \frac{1}{4}sen(2t)\Big|_0^{\pi}\right\}$$

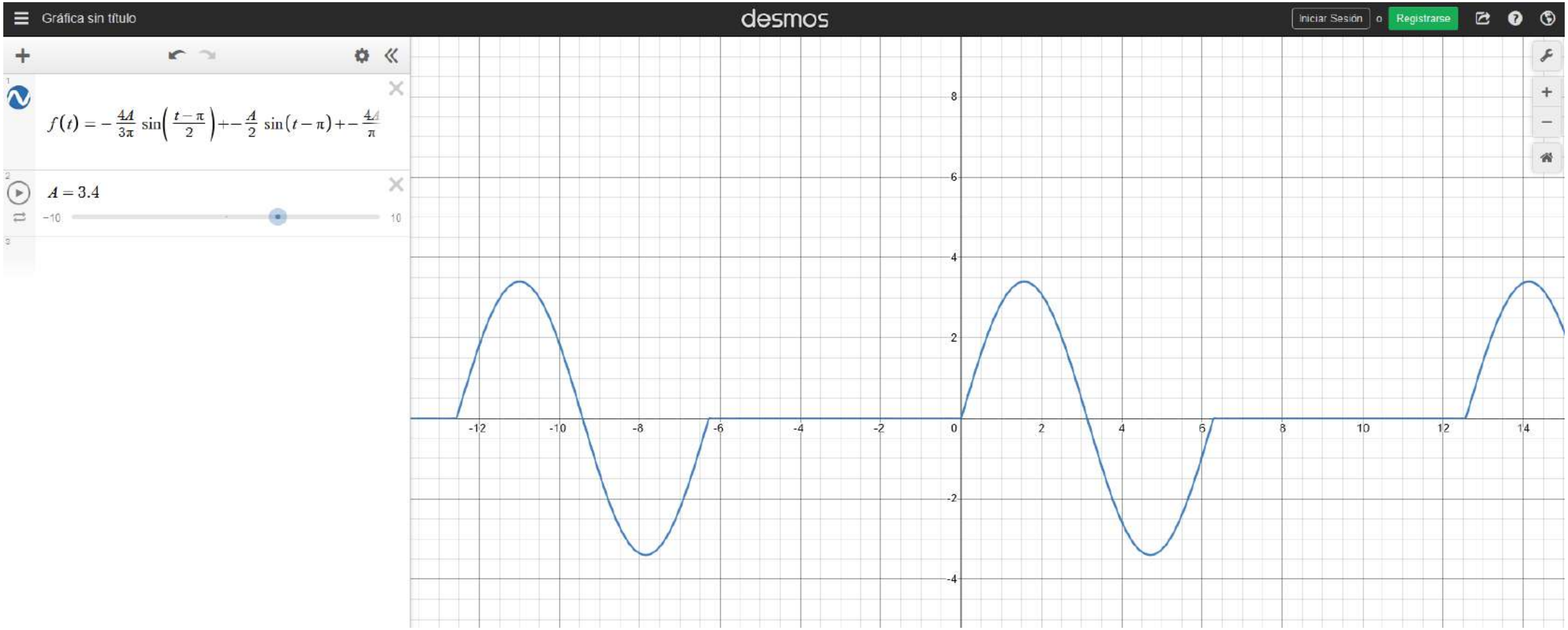
$$b_2 = \frac{A}{\pi}\left[\frac{\pi}{2} - \left(\cancel{\frac{1}{4}sen(2\pi)} - \cancel{\frac{1}{4}sen(2\cdot 0)}\right)\right]$$

$$b_2 = \frac{A}{\cancel{\pi}} \cdot \frac{\cancel{\pi}}{2} = \boxed{\frac{-A}{2}}$$

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

$$f(t\ \pi) = -\frac{A}{2} sen(t) + \sum_{n=1}^{\infty} \frac{4A sen(\frac{n\pi}{2})}{\pi(4-n^2)} \quad , \quad t = t - \pi$$

$$f(t) = \frac{-A}{2} sen(t-\pi) + \sum_{n=1}^{\infty} \frac{4A sen(\frac{n\pi}{2})}{\pi(4-n^2)}$$



Gráfica sin título
desmos
Iniciar Sesión
o
Registrarse
$f(t) = -\frac{4A}{3\pi}\sin\left(\frac{t-\pi}{2}\right) + -\frac{A}{2}\sin(t-\pi) + -\frac{4A}{\pi}$
$A = 3.4$
−10
10
8
6
4
2
0
-2
-4
-12
-10
-8
-6
-4
-2
2
4
6
8
10
12
14