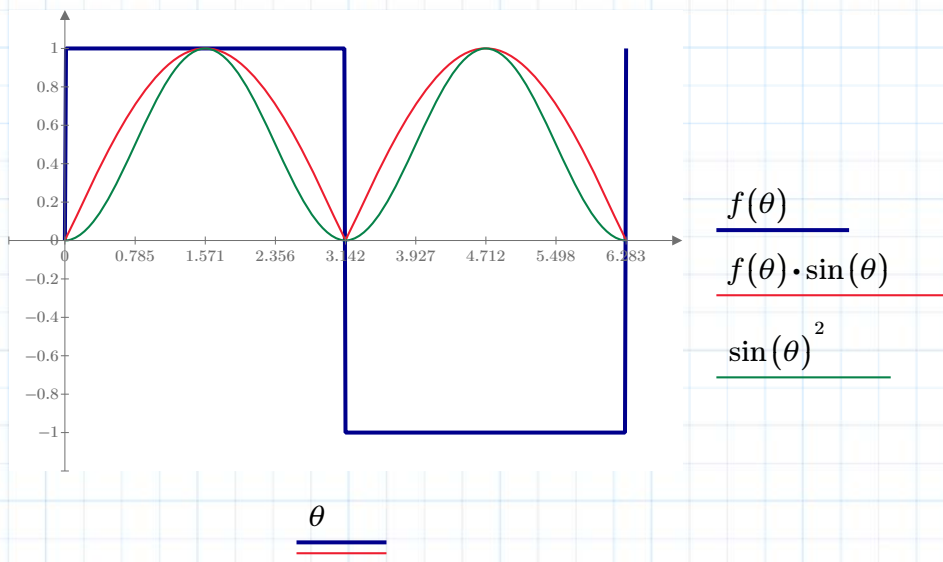


Ex.F2 Fourier-Analysis (Rectangular wave)

$$f(\theta) := \text{sign}(\sin(\theta)) \quad Em := 1$$



$$b_1 := \frac{2}{2 \cdot \pi} \int_0^{2 \cdot \pi} f(\theta) \cdot \sin(\theta) d\theta$$

$$b_1 = 1.273$$

$$\frac{4}{\pi} = 1.273$$

$$b_1 := \frac{2}{\pi} \int_0^{\pi} f(\theta) \cdot \sin(\theta) d\theta$$

$$b_1 = 1.273$$

$$b_1 := \frac{2}{\pi} \int_0^{\frac{\pi}{2}} f(\theta) \cdot \sin(\theta) d\theta$$

$$b_1 = 1.273$$

$$b_1 := \frac{2}{3 \cdot \pi} \int_0^{3 \cdot \pi} f(\theta) \cdot \sin(\theta) d\theta$$

$$b_1 = 1.273$$

$$b_1 := \frac{2}{\frac{\pi}{3}} \int_0^{\frac{\pi}{3}} f(\theta) \cdot \sin(\theta) d\theta$$

$$b_1 = 0.955$$

$$b_1 := \frac{2}{\frac{3 \cdot \pi}{2}} \int_0^{\frac{3 \cdot \pi}{2}} f(\theta) \cdot \sin(\theta) d\theta$$

$$b_1 = 1.273$$

$$b_2 := \frac{2}{\pi} \int_0^{\pi} f(\theta) \cdot \sin(2 \cdot \theta) d\theta$$

$$b_2 = 7.071 \cdot 10^{-17}$$

$$b_3 := \frac{2}{\pi} \int_0^{\pi} f(\theta) \cdot \sin(3 \cdot \theta) d\theta$$

$$b_3 = 0.424$$

$$\frac{4}{3 \cdot \pi} = 0.424$$

$$b_4 := \frac{2}{\pi} \int_0^{\pi} f(\theta) \cdot \sin(4 \cdot \theta) d\theta$$

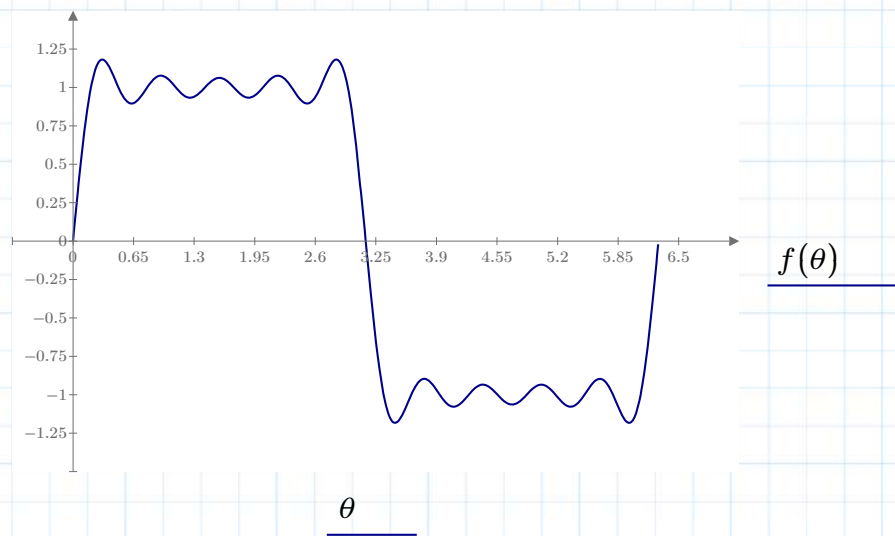
$$b_4 = -4.913 \cdot 10^{-17}$$

$$f(\theta) := \frac{4}{\pi} \cdot \left(\sin(\theta) + \frac{1}{3} \cdot \sin(3 \cdot \theta) + \frac{1}{5} \cdot \sin(5 \cdot \theta) + \dots \right)$$

$$m := 5$$

$$f(\theta) := \sum_{n=1}^m \frac{4}{\pi} \cdot \left(\frac{1}{(2 \cdot n - 1)} \cdot \sin((2 \cdot n - 1) \cdot \theta) \right)$$

$$\theta := 0, 0.01 \dots 2 \cdot \pi$$

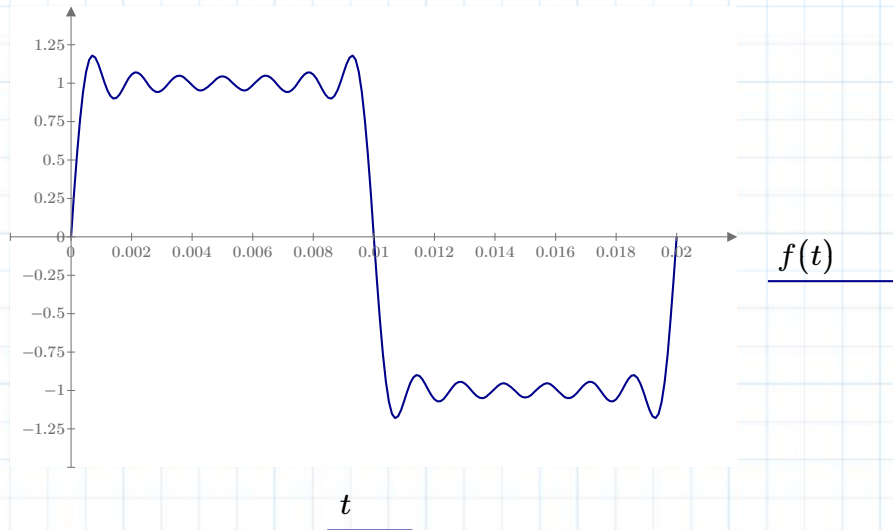


$$m := 7$$

$$f := 50 \quad E_m := 1 \quad \omega := 2 \cdot \pi \cdot f$$

$$f(t) := \sum_{n=1}^m \frac{4 \cdot E_m}{\pi} \cdot \left(\frac{1}{(2 \cdot n - 1)} \cdot \sin((2 \cdot n - 1) \cdot \omega \cdot t) \right)$$

$$t := 0, 0.0001 \dots 0.02$$



$$m := 7$$

$$f := 50 \quad E_m := 1 \quad \omega := 2 \cdot \pi \cdot f \quad \theta := \frac{\pi}{2} \quad \text{phase lead}$$

$$f(t) := \sum_{n=1}^m \frac{4 \cdot E_m}{\pi} \cdot \left(\frac{1}{(2 \cdot n - 1)} \cdot \sin((2 \cdot n - 1) \cdot (\omega \cdot t + \theta)) \right)$$

$$t := 0, 0.0001 \dots 0.02$$

