

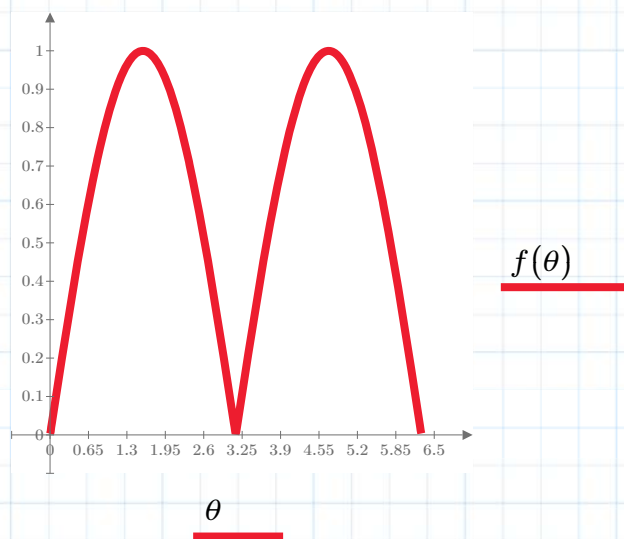
Ex.F6 Fourier-Analysis (Root mean squared value and average value of full rectification waves)

$$E_m := 1 \text{ V} \quad f := 50 \text{ Hz} \quad \phi := 0 \text{ deg} \quad \omega := 2 \cdot \pi \cdot f$$

$$m := 100 \quad m: \text{ Number of harmonics}$$

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

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



$$E_0 := \frac{2}{\pi}$$

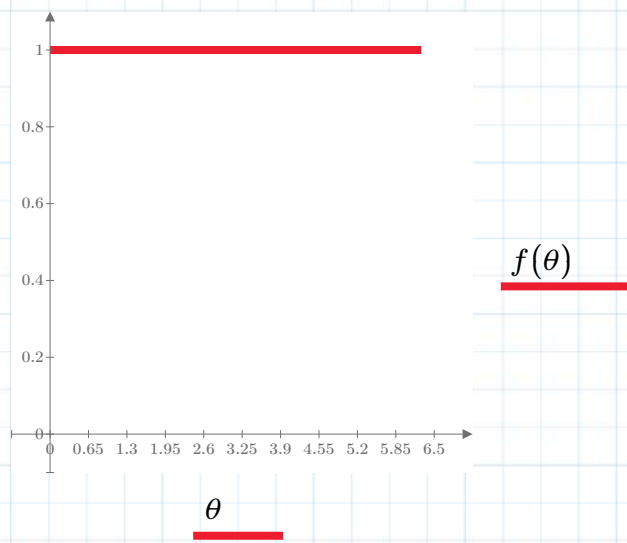
$$E_n := \frac{4}{\sqrt{2} \cdot \pi} \cdot \frac{1}{(2 \cdot n)^2 - 1}$$

$$E := \sqrt{E_0^2 + \sum_{n=1}^{\infty} (E_n)^2} \xrightarrow{\text{simplify}} \frac{\sqrt{2}}{2}$$

$$E_a := \frac{2}{\pi} + \sum_{n=1}^{\infty} (E_n) \cdot 0 \rightarrow \frac{2}{\pi}$$

$$\sum_{n=1}^{100} \left( \int_0^{2 \cdot \pi} \cos(2 \cdot n \cdot (\theta + \phi)) d\theta \right) \rightarrow 0$$

$$f(\theta) := 1$$



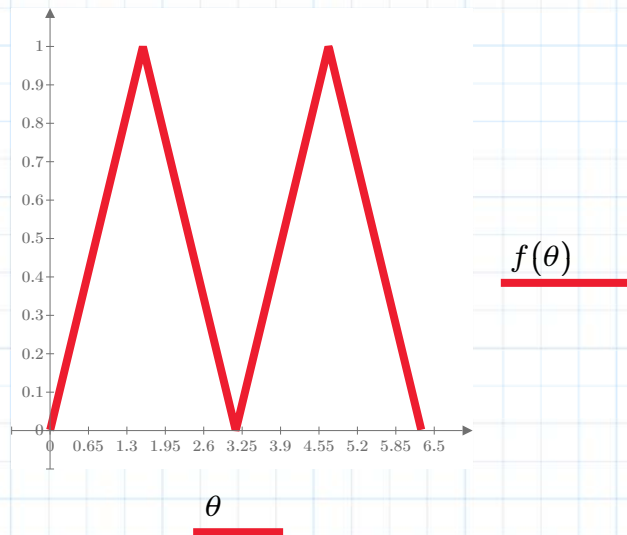
$$E_0 := 1$$

$$E_n := 0$$

$$E := \sqrt{E_0^2 + \sum_{n=1}^{\infty} (0)^2} \xrightarrow{\text{simplify}} 1$$

$$E_a := 1 + \sum_{n=1}^{\infty} (0) \rightarrow 1$$

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



$$E_0 := \frac{1}{2}$$

$$E_n := \frac{4}{\sqrt{2} \cdot \pi^2} \cdot \left( \frac{1}{(2 \cdot n - 1)^2} \right)$$

$$E := \sqrt{E_0^2 + \sum_{n=1}^{\infty} (E_n)^2} \xrightarrow{\text{simplify}} \frac{\sqrt{3}}{3}$$

$$E_a := \frac{1}{2} + \sum_{n=1}^{\infty} \left( \frac{4}{\sqrt{2} \cdot \pi} \cdot \frac{1}{(2 \cdot n)^2 - 1} \right) \cdot 0 \rightarrow \frac{1}{2}$$