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Introduction of Fourier series

In Fourier series, the orthogonal set of trigonometric function is used

where a function $f(x)$ can be expanded by a Fourier series as

$$f(x) =$$

a_n, b_n : Fourier coefficients, which can be found by the general procedures in

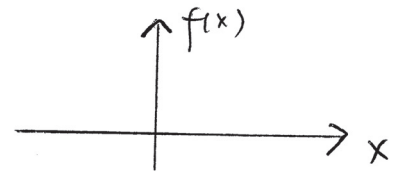
Find a_0 :

Find a_1 :

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Example: Use Fourier series to expand

$$f(x) = \begin{cases} 0, & \text{for } -\pi < x < 0 \\ \pi - x, & \text{for } 0 \leq x < \pi \end{cases}$$



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Remarks:

① In the example, function $f(x)$ is expanded by a Fourier series:

$$f(x) = \frac{\pi}{2} + \left\{ \sum_{n=1}^{\infty} \frac{1-(-1)^n}{n^2\pi} \cos nx + \frac{1}{n} \sin nx \right\}$$

There are, in fact, some differences