

Fourier series for function with period 2L

	Standard form	General form
週期	$0 \sim 2\pi$	$0 \sim 2L$
f(x) 的圖		
基底	$1, \cos(x), \sin(x), \cos(2x), \sin(2x), \dots, \cos(nx), \sin(nx)$	$1, \cos\left(\frac{\pi x}{L}\right), \sin\left(\frac{\pi x}{L}\right), \cos\left(\frac{2\pi x}{L}\right), \sin\left(\frac{2\pi x}{L}\right), \dots, \cos\left(\frac{n\pi x}{L}\right), \sin\left(\frac{n\pi x}{L}\right)$
f(x)	$f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos(nx) + b_n \sin(nx)$	$f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos\left(\frac{n\pi x}{L}\right) + b_n \sin\left(\frac{n\pi x}{L}\right)$
長度	$1 \Rightarrow \int_0^{2\pi} 1 dx = 2\pi$ $\cos(nx) \Rightarrow \int_0^{2\pi} \cos^2(nx) dx = \pi$ $\sin(nx) \Rightarrow \int_0^{2\pi} \sin^2(nx) dx = \pi$	$1 \Rightarrow \int_0^{2L} 1 dx = 2L$ $\cos\left(\frac{n\pi x}{L}\right) \Rightarrow \int_0^{2L} \cos^2\left(\frac{n\pi x}{L}\right) dx = L$ $\sin\left(\frac{n\pi x}{L}\right) \Rightarrow \int_0^{2L} \sin^2\left(\frac{n\pi x}{L}\right) dx = L$