

Let f be a smooth function on \mathbb{R} with period 2π and average value 0. Let $a_1(x) = \sin x$, $a_2(x) = \sin 2x$, $a_3(x) = \sin 3x$, etc., and let $b_1(x) = \cos x$, $b_2(x) = \cos 2x$, $b_3(x) = \cos 3x$, etc. Then

$$f = \sum_{i=1}^{\infty} [(f \cdot a_i) \times a_i + (f \cdot b_i) \times b_i].$$