A Fourier series example[1]

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The Fourier series for

$$f(x) = \begin{cases} -1 & -\pi < x < 0 \\ 1 & 0 < x < \pi \end{cases} \tag{1}$$

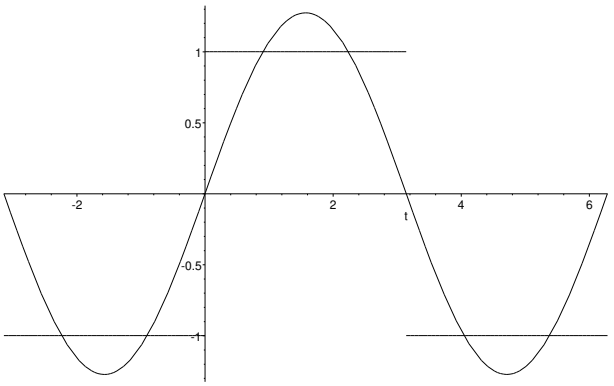
with $f(x + 2\pi) = f(x)$ is

$$f(x) = \frac{4}{\pi} \sum_{n \text{ odd}} \frac{1}{n} \sin nx \tag{2}$$

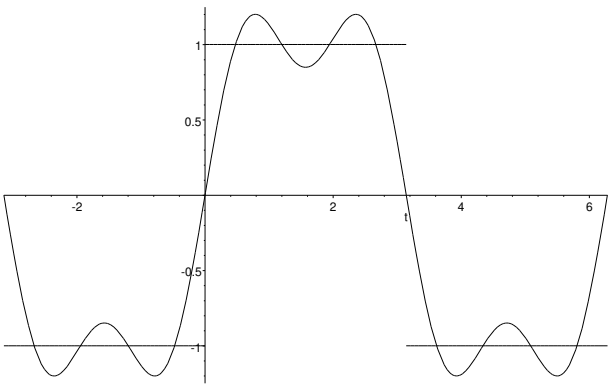
If we write

$$f_N(x) = \frac{4}{\pi} \sum_{n \text{ odd, } n \leq N} \frac{1}{n} \sin nx \tag{3}$$

then

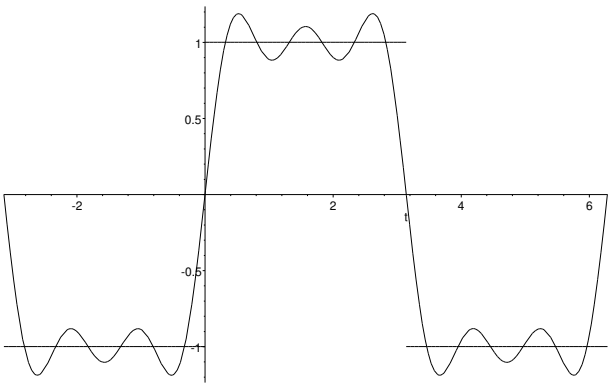


$f_1(x)$

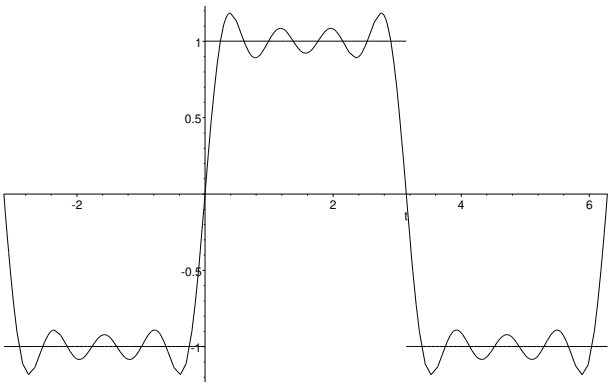


$f_3(x)$

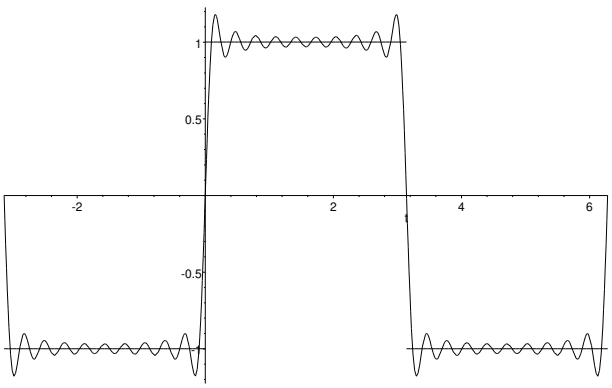
[1]Conor Houghton, houghton@maths.tcd.ie, see also http://www.maths.tcd.ie/~houghton/231



$f_5(x)$



$f_7(x)$



$f_{19}(x)$