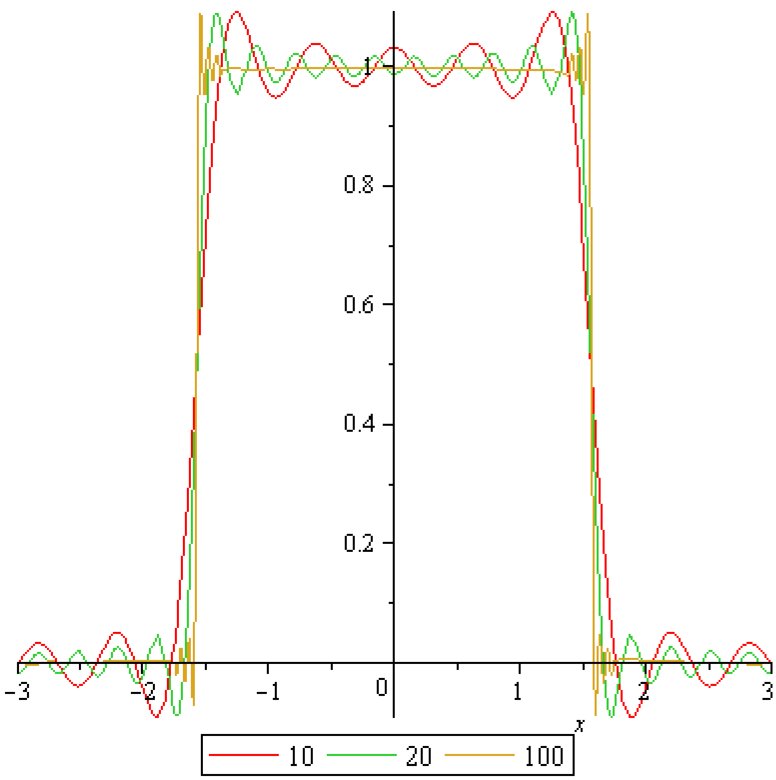
Example: It can be shown that the discontinuous rectangular pulse function:

$$f(x)=\begin{cases} 0 & , \quad -\pi < x < -\dfrac{\pi}{2} \\ 1 & , \quad -\dfrac{\pi}{2} < x < \dfrac{\pi}{2} \\ 0 & , \quad \dfrac{\pi}{2} < x < \pi \end{cases}$$

has the following Fourier series:

$$f(x)=\frac{1}{2}+\frac{2}{\pi}\left(\cos(x)-\frac{\cos(3x)}{3}+\frac{\cos(5x)}{5}-\frac{\cos(7x)}{7}+\cdots\right)$$

The following figure has been plotted for 10, 20, and 100 terms of the Fourier series.



The Gibbs phenomenon is clearly observed at the discontinuous points.