Fourier Transform Applications
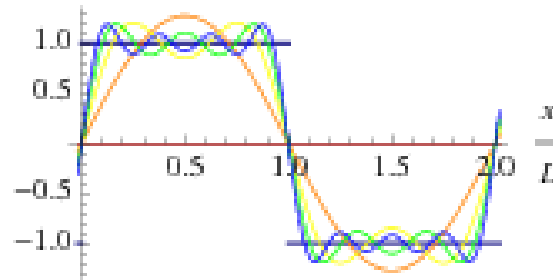
Fourier series
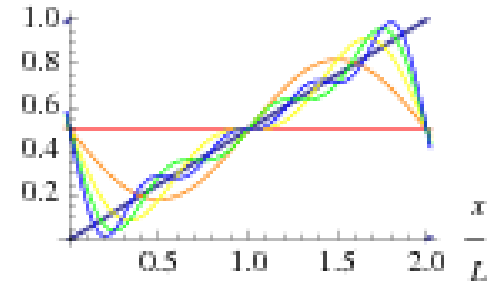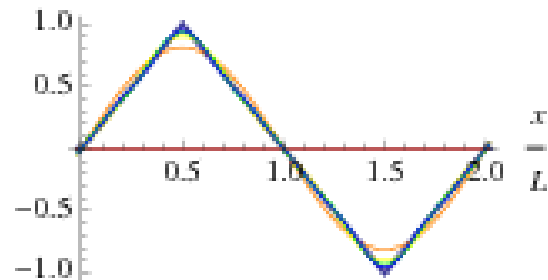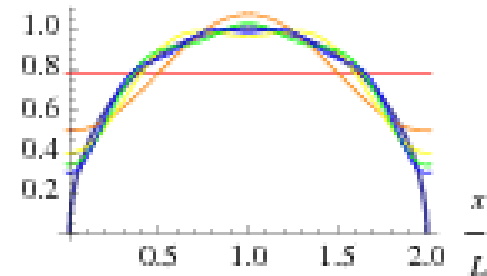
Fourier Series

square wave

sawtooth wave

triangle wave

semicircle

A Fourier series is an expansion of a periodic function in terms of an infinite sum of sines and cosines. Fourier series make use of the orthogonality of the sine and cosine functions.

Mathematically we can express the Fourier series as:

$$f(x) = \frac{1}{2}a_0 + \sum_{n=1}^{\infty} a_n \cos(n\,x) + \sum_{n=1}^{\infty} b_n \sin(n\,x)$$

$$a_0 = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x)\,dx$$

$$a_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x)\cos(n\,x)\,dx$$

$$b_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x)\sin(n\,x)\,dx$$