Gaussian Function and its (Truncated) Fourier Representation

\[ F_f(x, a_0, N) := \sum_{n = -N}^{N} \frac{1}{2L} \sqrt{\pi \cdot a_0} \cdot \exp \left( -\frac{n^2 \cdot \pi^2 \cdot a_0^2}{4L^2} \right) \cdot \exp \left( i \cdot \frac{n \cdot \pi \cdot x}{L} \right) \]

\[ a_0 = 0.4, \quad L = 2, \quad N = 2, 4, 6 \]
Fourier Series Representation is Periodic

Red = Gaussian, Blue = FS Representation of Gaussian
(L = 2)