$g(t)$ is a real function.

An asymmetric form of Fourier and Inverse Fourier transforms is used by engineers and physicists.

$$G(\omega) = \int_{-\infty}^{\infty} g(t)\, e^{-i\omega t}\, dt; \quad g(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} G(\omega)\, e^{i\omega t}\, d\omega$$

If units of $g(t)$ are volts then $G(\omega)$ has units of volts/Hz

set time domain 0 to T with M samples.

$\Delta = \frac{T}{M}$; define index $k = 0, \ldots, M-1$; $t_k = \Delta \bullet k$; $g_k = g(t_k)$

Use antisymmetric form of DFT

$$G_l = \sum_{k=0}^{M-1} g_k e^{-i2\pi \frac{l \cdot k}{M}}; \quad g_k = \frac{1}{M} \sum_{l=0}^{M-1} G_l e^{i2\pi \frac{l \cdot k}{M}}$$

g_k and G_l has the same units. What is the relation between $G(\omega)$ and G_l?

$$G(2\pi f) = \int_{-\infty}^{\infty} g(t) e^{-i2\pi ft}\, dt \quad \ldots f = \frac{l}{N \cdot \Delta}$$

$$G(2\pi f_l) = \int_{-\infty}^{\infty} g(t) e^{-i2\pi \frac{l}{N\Delta} t}\, dt \Rightarrow \tilde{G}_l = \sum_{-M/2}^{M/2} g_k e^{-i2\pi \frac{l \cdot k}{N}} \Delta$$

$$G_l = \tilde{G}_l \cdot \frac{1}{\Delta}$$

It is useful to pay attention to the units when plotting G_l. To get units of V/Hz, multiply the DFT by the time increment Δ