

The 3 Ways to Use Frequency Response

Input is
sinusoids

Input is
Periodic

Input is
Aperiodic

Input

$$X(t) = A_1 \cos(\omega_1 t + \theta_1)$$

or

$$X(t) = A_1 e^{j(\omega_1 t + \theta_1)}$$

Input

$$X(t) = \sum_{k=-\infty}^{\infty} C_k e^{jk\omega_s t}$$

Input

$$X(t)$$

Output

$$y(t) = \underline{A_1 |H(\omega_1)|} \cos(\omega_1 t + \theta_1 + \underline{\angle H(\omega_1)})$$

or

$$y(t) = \underline{A_1 H(\omega_1)} e^{j(\omega_1 t + \theta_1)}$$

Output

$$y(t) = \int \{ \underline{X(\omega) H(\omega)} \}$$

Output

$$y(t) = \sum_{k=-\infty}^{\infty} \underline{C_k H(k\omega_s)} e^{jk\omega_s t}$$