For periodic functions $x_1(t)$, $x_2(t)$ with periods T_1 and T_2 respectively, the period of $x_1(t) + x_2(t)$ is $LCM(T_1, T_2)$.
For periodic functions $x_1[n]$, $x_2[n]$ with periods N_1 and N_2 respectively, the period of $x_1[n] + x_2[n]$ is $LCM(N_1, N_2)$.

$$E = \int_{t_1}^{t_2} |x(t)|^2 dt$$
$$= \int_{t_1}^{t_2} (x_{Re}(t)^2 + x_{Im}(t)^2) dt.$$

$$E = \sum_{n=n_1}^{n_2} |x[n]|^2$$
$$= \sum_{n=n_1}^{n_2} (x_{Re}[n]^2 + x_{Im}[n]^2).$$

$$P_{avg} = \frac{1}{t_2 - t_1} \int_{t_1}^{t_2} |x(t)|^2 dt.$$

$$P_{avg} = \frac{1}{n_2 - n_1 + 1} \sum_{n=n_1}^{n_2} |x[n]|^2.$$

$$P_\infty = \lim_{T \to \infty} \frac{1}{2T} \int_{-T}^{T} |x(t)|^2 dt$$

$$P_\infty = \lim_{N \to \infty} \frac{1}{2N+1} \sum_{n=-N}^{N} |x[n]|^2$$

$$x(t) = x_{even}(t) + x_{odd}(t)$$
$$= \frac{x(t) + x(-t)}{2} + \frac{x(t) - x(-t)}{2}$$

$$x[n] = x_{even}[n] + x_{odd}[n]$$
$$= \frac{x[n] + x[-n]}{2} + \frac{x[n] - x[-n]}{2}$$

$$x_k(t) = e^{jk\omega_0 t}, k \in \mathbb{Z}$$
$$\omega_0 = \frac{2\pi}{T}, \text{ period T}$$
$$x_k[n] = e^{jk\omega_0 n}, k \in \mathbb{Z}$$
$$\omega_0 = \frac{2\pi}{N}, \text{ period N}$$

- A *memoryless* system depends only on input at time t (or n for DT systems).

- A *linear* system satisfies $S\{ax_1(t) + bx_2(t)\} = aS\{x_1(t)\} + bS\{x_2(t)\}$.

- A system is *time invariant* if a time shift (t_0 or n_0) in the input results in an identical shift in the output.

- A *linear time invariant*'s impulse response h is found by calculating $S(\delta(t))$ (or $S(\delta[n])$). $y(t) = x(t) * h(t)$ (or $y[n] = x[n] * h[n]$).

- A system is *invertible* if there exists an inverse S_2 such that $S_2(S_1(x(t))) = S_1(S_2(x(t))) = x(t)$.

- A system is *causal* if its output at time t (index n) depends only on present and past inputs.

- A system is *stable* if there exist constants $B, M > 0$ such that $|x(t)| < B \; \forall t \implies |y(t)| < M \; \forall t$.

Name	Series	Sum
Geometric	$\sum_{i=0}^{n} a_0 r^i$	$a_0 \frac{1-r^n}{1-r}$
Arithmetic	$\sum_{i=0}^{n} (a + id)$	$\frac{n}{2}(2a + (n-1)d)$