Extra Topics

1 Modulo Operator (Arithmetic Remainder)

If $x \in \mathbb{R}^+$ and $n \in \mathbb{N}$, we can uniquely write $x = mn + r$, where $m \in \mathbb{W}$ and $r \in [0, n)$.
We define

$$x \bmod n = r$$

e.g. $10.5 \bmod 3 = 1.5$

2 Every Function can be expressed as sum of two Even and Odd Symmetric Functions about $x = a$

Let $f(x)$ be any general function.
Let $E(x)$ be a function Even Symmetric about $x = a$ and
$O(x)$ be a function Odd Symmetric about $x = a$
$\therefore$

$$E(a + x) = E(a - x)$$
$$O(a + x) = -O(a - x)$$

such that,

$$f(x) = E(x) + O(x)$$

Hence,

$$E(x) = \frac{f(x) + f(2a - x)}{2}$$
$$O(x) = \frac{f(x) - f(2a - x)}{2}$$

$$f(x) = \underbrace{\frac{f(x) + f(2a - x)}{2}}_{\text{Even Symmetric Part}} + \underbrace{\frac{f(x) - f(2a - x)}{2}}_{\text{Odd Symmetric Part}}$$