Classification of Signals
2.

Even and odd signs.

Example: $x(t)$ is an odd function.

$$
\begin{align*}
\mathcal{L}\left[ x(t) \right] &= \mathcal{L}\left[ x(t) \right] \\
\mathcal{L}\left[ (-t)x(t) \right] &= \mathcal{L}\left[ (-t)x(t) \right] \\
\end{align*}
$$

Odd: $n$ even

Even: $n$ odd
\[ x(t) = a(t^-) + b(t^-) \]

\[ y(t) = c(t^-) \]

The equations are read as

\[ x(t^-) \]

is simply \( \sum \) for \( t \) from 0 to \( t^- \).

\[ x(t) = \begin{cases} \sum_{n=0}^{\infty} x_n(t) & \text{for } x(t^-) \leq t \leq x(t) \\ \sum_{n=0}^{\infty} x_n(t^-) & \text{for } x(t^-) > t \end{cases} \]

Now it's clear that

\[ (t^-)^2 x = (t^2) x \]

\[ (t^-)^2 x = (t^2) x \text{ and note that} \quad \frac{\partial}{\partial t} (t^-)^2 x = (t^-)^2 x \]

but, \( \frac{\partial}{\partial t} x(t^-) = (t^-)^2 x \) can be represented.

At this point, since \( x(t) \) can be replaced.

3
A periodic signal is a periodic signal which is not 

Then \( x(t) \) is a periodic signal 

\[ f(t) = 2 \pi \text{ F} \text{ (rad/sample)} \]
\[ f_p = \frac{1}{N} \text{ cycles/sample} \]
\[ N_p = \frac{N}{f_p} \text{ samples/period} \]

The fundamental period, \( T \), is given by 

\[ T = \frac{1}{f_p} \]

Angular frequency, \( \omega_p = 2\pi f_p \]

**Fundamental frequency** 

Then \( x(t) \) is periodic with 

\[ x(t) = x(t + T) \]
In order for \( x \in \mathbb{N} \) to be periodic with \( N \) then

\[ x \in \mathbb{N} \implies x = x(n + N \cdot k) \quad \text{for} \quad k \in \mathbb{Z} \]

Hence

\[ x \in \mathbb{N} \implies x = x(n + N \cdot k) \uparrow \]

Now, suppose \( x \in \mathbb{N} \) is periodic. Then

\[ x \in \mathbb{N} \implies \exists \quad \text{for} \quad k \in \mathbb{Z} \]

Suppose \( x(t) \) is periodic with period \( T \) is a rational number.
\[
\begin{align*}
y(t) &= 1 - \cos(2\pi t) + 2.2e^{-t} \cos(4\pi t) \\
\text{and } T_p &= \frac{1}{3} \\
\text{The angle } T_s &= \frac{1}{2} T_p \\
\text{now } T_p = \frac{5}{11} \\
\text{No solution for } T_s \neq \text{ rational number} \\
\therefore \text{Graph is sinusoidal with } f = 11 \\
\text{is sinusoidal if } f = 1 \\
\therefore x(t) = \frac{2}{1 - \cos(4\pi ft)} + 2.2e^{-t} \\
\text{is not sinusoidal} \\
x(t) = \sin^2(20\pi ft).
\end{align*}
\]