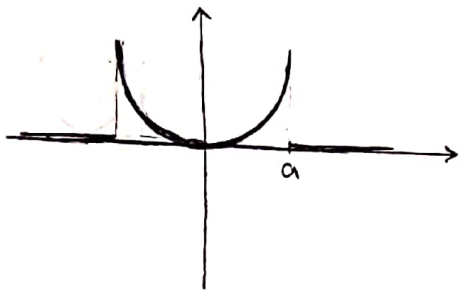


بسم الله الرحمن الرحيم
 بائع ترین سری 8 رانی محضی (سری فوری)



→ بجز زوج مدغم

→ بائع زوج

$$B(\omega) = 0$$

$$A(\omega) \checkmark$$

$$f(x) = \begin{cases} x^2 & x < a \\ 0 & x > a \end{cases}$$

1- انتگرال فوری
 $x < a$
 $x > a$

$$f(x) = \frac{1}{\pi} \int_0^{\infty} [A(\omega) \cos \omega x + B(\omega) \sin \omega x] d\omega$$

$$A(\omega) = \int_{-\infty}^{\infty} f(x) \cos \omega x dx = 2 \int_0^{\infty} f(x) \cos \omega x dx = 2 \int_0^a x^2 \cos \omega x dx$$

$$= 2 \left[\frac{x^2}{\omega} \sin \omega x + \frac{2x}{\omega^2} \cos \omega x - \frac{2}{\omega^3} \sin \omega x \right]_0^a$$

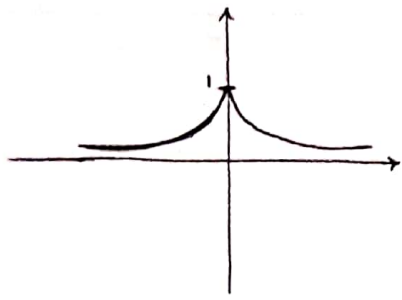
$$= 2 \left[\frac{a^2}{\omega} \sin a\omega + \frac{2a}{\omega^2} \cos a\omega - \frac{2}{\omega^3} \sin a\omega \right]$$

$$= \frac{2}{\omega} \left[\left(a^2 - \frac{2}{\omega^2} \right) \sin a\omega + \frac{2a}{\omega} \cos a\omega \right]$$

$$\Rightarrow f(x) = \frac{1}{\pi} \int_0^{\infty} \left(\frac{2}{\omega} \left[\left(a^2 - \frac{2}{\omega^2} \right) \sin a\omega + \frac{2a}{\omega} \cos a\omega \right] \times \cos \omega x \right) d\omega$$

$$f(x) = \frac{2}{\pi} \int_0^{\infty} \left[\left(a^2 - \frac{2}{\omega^2} \right) \sin a\omega + \frac{2a}{\omega} \cos a\omega \right] \frac{\cos \omega x}{\omega} d\omega \quad \checkmark$$

مشتق	انتگرال
x^2	$\cos \omega x$
$2x$	$+\frac{1}{\omega} \sin \omega x$
2	$-\frac{1}{\omega^2} \cos \omega x$
0	$+\frac{1}{\omega^3} \sin \omega x$



بسط زوج و فرد

$$\begin{cases} f(x) = e^{-x} & x > 0 \\ f(x) = f(-x) \end{cases}$$

2- انتگرال فردی

$B(\omega) = 0 \leftarrow$ تابع زوج

$A(\omega) \checkmark$

$$f(x) = \frac{1}{\pi} \int_{-\infty}^{\infty} [A(\omega) \cos \omega x + B(\omega) \sin \omega x] d\omega$$

$$A(\omega) = \int_{-\infty}^{\infty} f(x) \cos \omega x dx = 2 \int_0^{\infty} f(x) \cos \omega x dx = 2 \int_0^{\infty} e^{-x} \cos \omega x dx$$

$$\Rightarrow \underbrace{\int_0^{\infty} e^{-x} \cos \omega x dx}_I = \left[\frac{e^{-x}}{\omega} \sin \omega x - \frac{e^{-x}}{\omega^2} \cos \omega x \right]_0^{\infty} - \underbrace{\frac{1}{\omega^2} \int_0^{\infty} e^{-x} \cos \omega x dx}_{I/\omega^2}$$

$$\Rightarrow \left(1 + \frac{1}{\omega^2}\right) I = \left[\frac{e^{-x}}{\omega} \sin \omega x - \frac{e^{-x}}{\omega^2} \cos \omega x \right]_0^{\infty} = + \frac{1}{\omega^2}$$

$$\Rightarrow I = \frac{1}{\omega^2 + 1} \quad \xrightarrow{A(\omega) = 2I} \quad A(\omega) = \frac{2}{\omega^2 + 1}$$

$$\Rightarrow f(x) = \frac{2}{\pi} \int_{-\infty}^{\infty} \left(\frac{1}{\omega^2 + 1} \right) \cos \omega x d\omega \quad \checkmark$$

مقدار	انتگرال
e^{-x}	$\cos \omega x$
$-e^{-x}$	$\frac{1}{\omega} \sin \omega x$
$-e^{-x}$	$-\frac{1}{\omega^2} \cos \omega x$
$+e^{-x}$	$+\frac{1}{\omega^2} \cos \omega x$