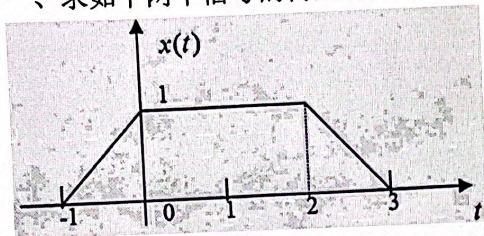


信号与系统第二次测试 (2022 年)

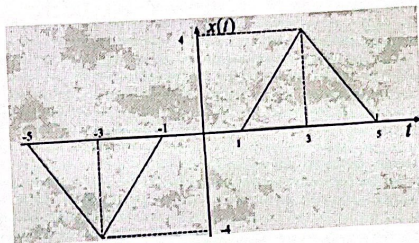
姓名:

学号:

一、求如下两个信号的傅里叶变换



(1)



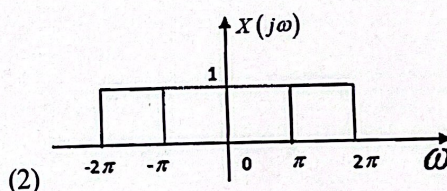
(2)

$$\textcircled{1} \quad X(j\omega) = 3 \text{Sa}\left(\frac{3}{2}\omega\right) \text{Sa}\left(\frac{\omega}{2}\right) e^{-j\omega}$$

$$\textcircled{2} \quad X(j\omega) = 8 \text{Sa}^2(\omega) [-2j \sin(3\omega)] \\ = -16j \text{Sa}^2(\omega) \sin(3\omega)$$

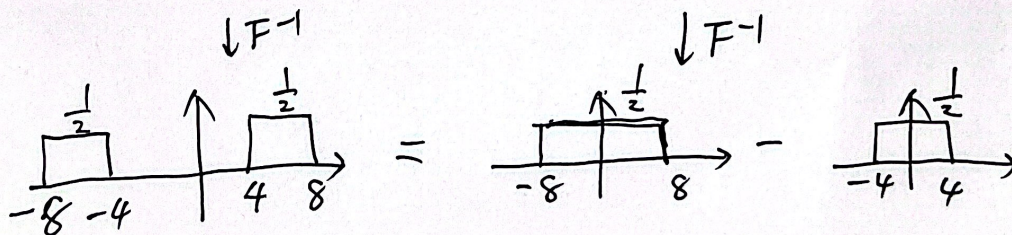
二、求如下两个信号的傅里叶反变换

$$\textcircled{1} \quad X(j\omega) = \frac{2\sin(2\omega)\cos(6\omega)}{\omega} e^{-j3\omega}$$

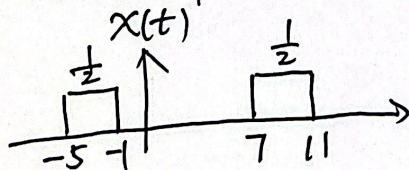


(2)

$$\textcircled{1} \quad \frac{2 \sin(2\omega) \cos(6\omega)}{\omega} = \frac{\sin(8\omega)}{\omega} - \frac{\sin(4\omega)}{\omega}$$



右移 3 位即是答案

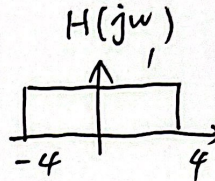
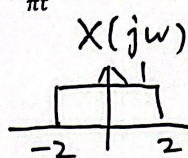


$$\textcircled{2} \quad x(t) = \frac{\sin(2\pi t) - \sin(\pi t)}{\pi t}$$

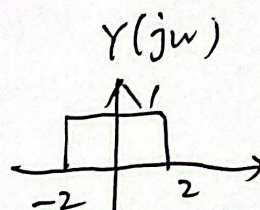
三、求两个信号 $x(t) = \frac{\sin(2t)}{\pi t}$ 和 $h(t) = \frac{\sin(4t)}{\pi t}$ 的卷积 $y(t)$ 。

解：

$$Y(j\omega) =$$



=



$$y(t) = \frac{\sin(2t)}{\pi t}$$

四、已知微分方程

$$\frac{d^2 y(t)}{dt^2} + 3 \frac{dy(t)}{dt} + 2y(t) = \frac{dx(t)}{dt} + x(t)$$

试求当 $x(t) = e^{-t}u(t)$ 时，系统的零状态响应 $y(t)$ 。

解：

$$(j\omega)^2 + 3j\omega + 2) Y(j\omega) = (j\omega + 1) X(j\omega)$$

$$= (j\omega + 1) \cdot \frac{1}{j\omega + 1} = 1$$

$$Y(j\omega) = \frac{1}{(j\omega + 2)(j\omega + 1)} = \frac{1}{j\omega + 1} - \frac{1}{j\omega + 2}$$

$$y(t) = (e^{-t} - e^{-2t}) u(t)$$