

6.21(a) 解: 由图知, $H(j\omega) = -2j\omega$

则 $Y(j\omega) = H(j\omega)X(j\omega) = -2j\omega X(j\omega)$

$\therefore y(t) = -2 \frac{dx(t)}{dt}$ $\therefore x(t) = e^{jt}$

$\therefore y(t) = -2je^{jt}$

6.25(a) 解: 由已知得

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

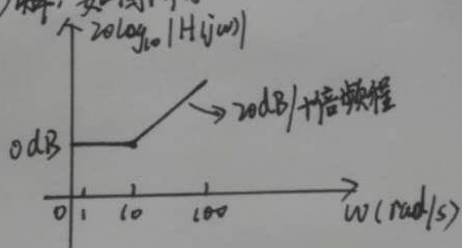
$\therefore \angle H_a(j\omega) = \tan^{-1}(-\omega)$

$\therefore \tau_a(\omega) = -\frac{d\angle H_a(j\omega)}{d\omega} = \frac{1}{1+\omega^2}$

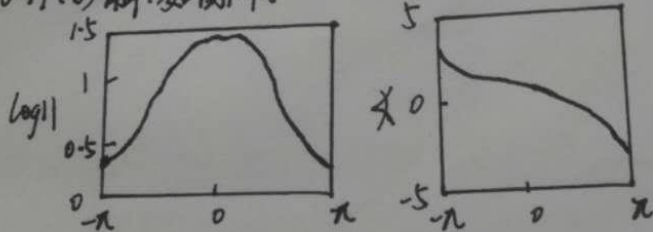
又 $\tau_a(0) = 1 \neq \tau_a(1) = \frac{1}{2}$ $\therefore \tau_a(\omega)$ 不是一个常量

\therefore 该频率响应具有非线性相位

6.28(a) (iv) 解: 如图所示

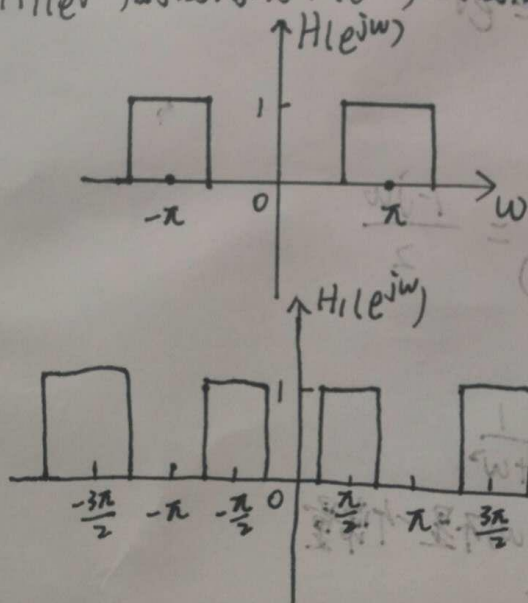


6.39(b) 解: 如图所示



6.40 解: 由已知得 $H_1(e^{j\omega}) = \sum_{n=-\infty}^{\infty} h_1[n] e^{j\omega n} = \sum_{n=-\infty}^{\infty} h_1[2n] e^{-j2\omega n}$
 $= \sum_{n=-\infty}^{\infty} h_1[2n] e^{j2\omega n}$
 $= H(e^{j2\omega})$

$\therefore H_1(e^{j\omega})$ 的图像为 $H(e^{j\omega})$ 的图像的压缩小一半的部分, 即



$\therefore H_1(e^{j\omega})$ 是一个带阻滤波器