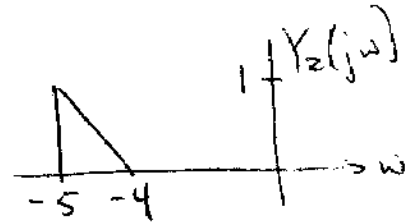
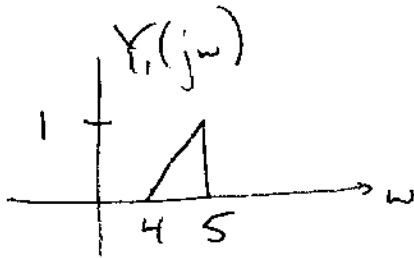
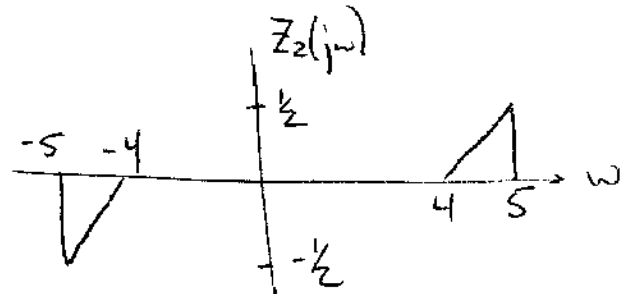
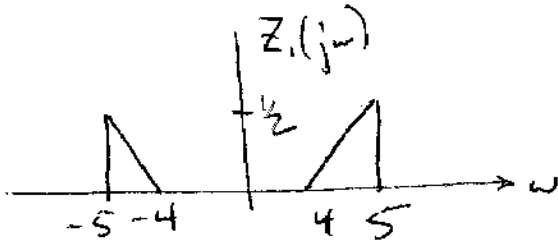
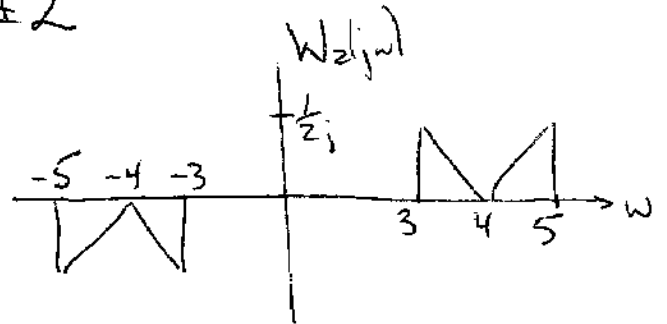
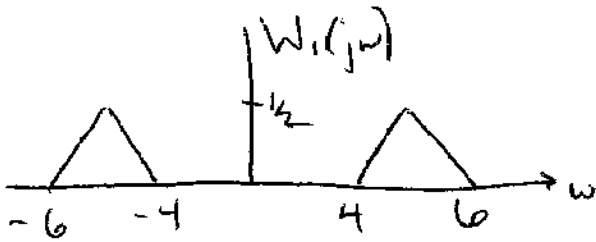


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SOLUTIONS TO QUIZ #2

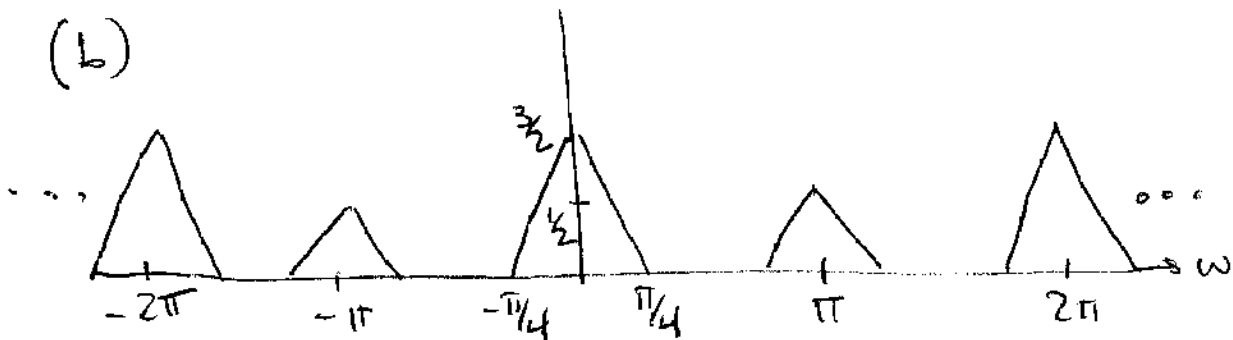
①



$$\begin{aligned} \textcircled{2} \text{ (a) } P(j\omega) &= \frac{2\pi}{(1)} \sum_{k=-\infty}^{\infty} \delta(\omega - \frac{2\pi k}{(1)}) + \frac{2\pi}{(2)} \sum_{k=-\infty}^{\infty} \delta(\omega - \frac{2\pi k}{(2)}) \\ &= 2\pi \sum_{k=-\infty}^{\infty} \delta(\omega - 2\pi k) + \pi \sum_{k=-\infty}^{\infty} \delta(\omega - \pi k) \end{aligned}$$

$$\Rightarrow a=3, b=1, c=1$$

(b)



$$\textcircled{3} (a) \Omega = \omega T \Rightarrow \text{sampled cosine freq.} = \frac{2\pi}{5} = 0.4\pi$$

$$\text{Corresponds to } H_1(e^{i0.4\pi}) = 1$$

$$\Rightarrow y(t) = \cos(2\pi t + \pi/2)$$

$$(b) \begin{array}{c} \text{1} \\ \text{---} \\ -\frac{3\pi}{8} \quad \frac{3\pi}{8} \end{array} \xleftrightarrow{\omega} \frac{\sin \frac{3\pi}{8} n}{\pi}$$

$$\Rightarrow h[n] = \left[e^{j\frac{\pi}{8}n} + e^{-j\frac{\pi}{8}n} \right] \frac{\sin \frac{3\pi}{8}n}{\pi} = \frac{2}{\pi} \cos\left(\frac{\pi}{8}n\right) \frac{\sin\left(\frac{3\pi}{8}n\right)}{2}$$

$$\Rightarrow a = \frac{2}{\pi}, \quad b = \frac{\pi}{8}, \quad c = \frac{3\pi}{8}$$

$$\textcircled{4} (a) T = 6$$

$$a_k = \frac{1}{6} \left\{ -e^{j\frac{2\pi(-2)k}{6}} + e^{j\frac{2\pi(-1)k}{6}} + 2 + e^{j\frac{2\pi k}{6}} + e^{j\frac{4\pi k}{6}} \right\}$$

$$a_k = \frac{1}{3} + \frac{1}{3} \cos\left(\frac{\pi k}{3}\right) - \frac{j}{3} \sin\left(\frac{2\pi k}{3}\right)$$

$$x[n] = \sum_{k=-2}^3 a_k e^{j\frac{2\pi kn}{6}}$$

$$(b) X(e^{j\Omega}) = 2\pi \sum_{k=-\infty}^{\infty} a_k \delta\left(\Omega - \frac{\pi k}{3}\right)$$

for the same a_k .