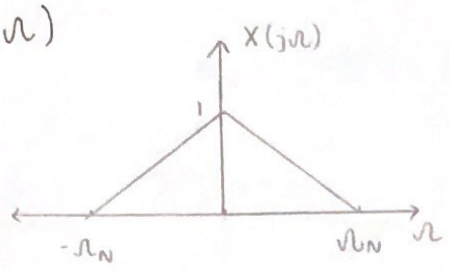
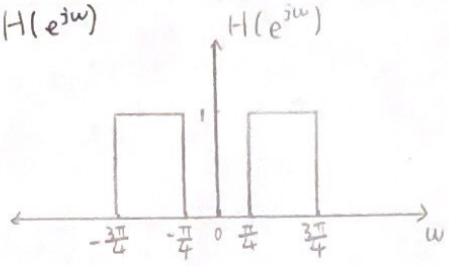
Quiz 1.

a) Sketch $X(e^{j\omega})$, $X_e(e^{j\omega})$, $Y(e^{j\omega})$, $Y_c(j\Omega)$

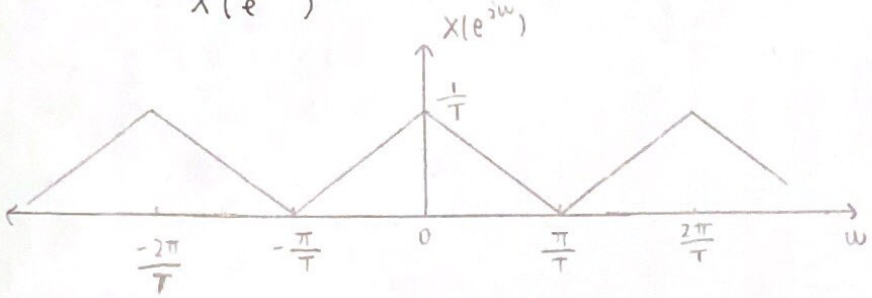
$X(j\Omega)$



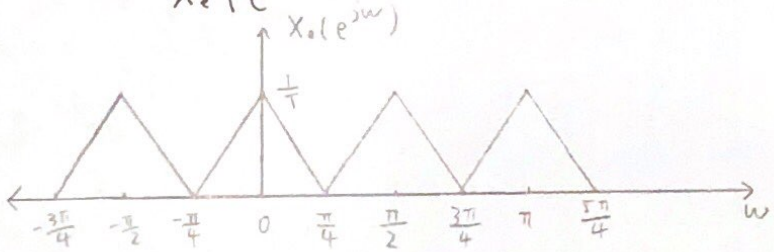
$H(e^{j\omega})$



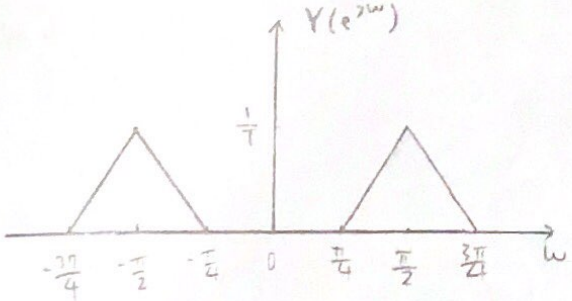
$X(e^{j\omega})$



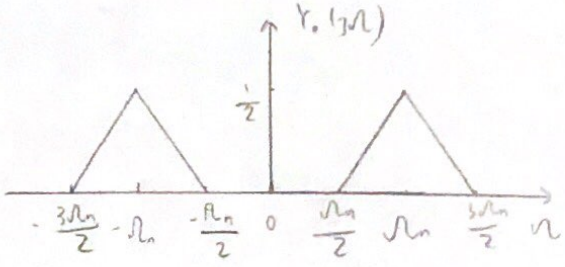
$X_e(e^{j\omega})$



$Y(e^{j\omega})$

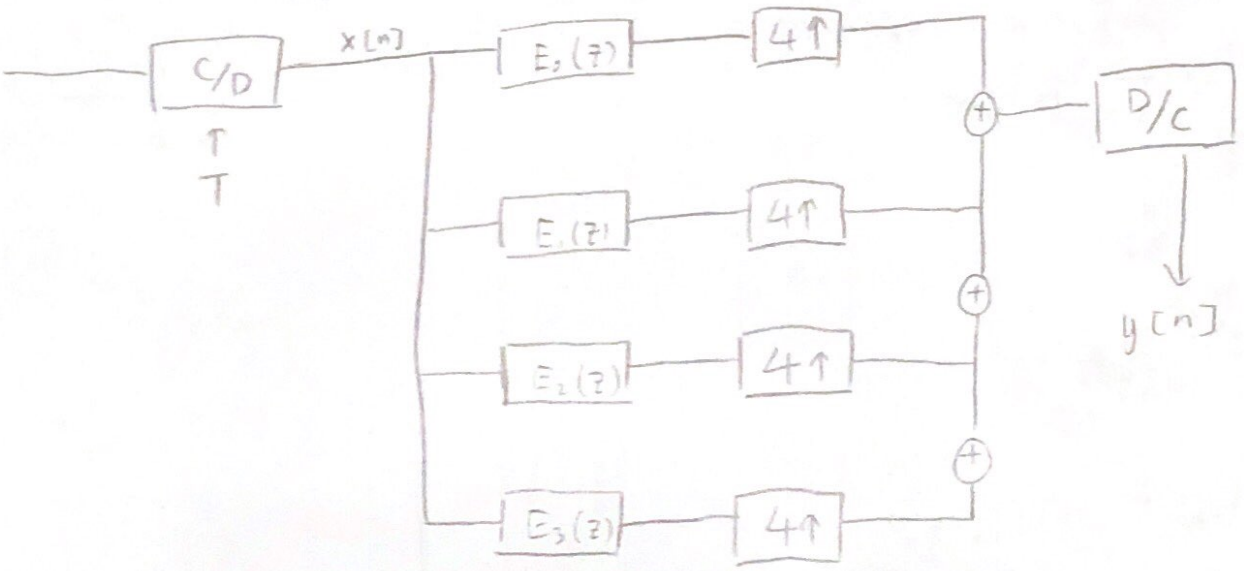


$Y_e(j\Omega)$



b) No. Because upsampling is not LTI.

c)

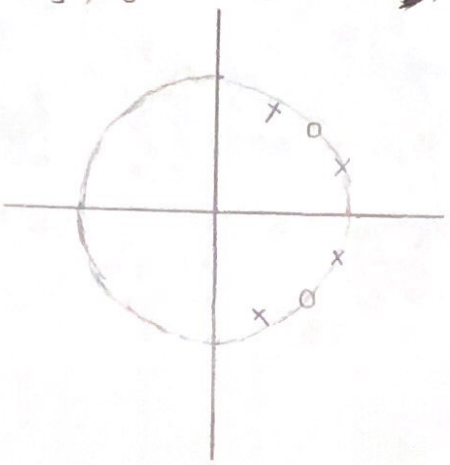


Quiz 02

1 a) ∵ Real impulse response

∴ poles & zeros are conjugate pairs.

poles : $\frac{3\pi}{5}$, $\frac{\pi}{5}$ zeros : [redacted], $\frac{2\pi}{5}$.



b) We can tell the length of the impulse response by looking at the number of [redacted] zeros, in this case IIR has infinite impulse response.

d) It is not stable, because there are poles on the unit circle.

Quiz 3.

e) No.

$$A = -20 \log_{10} \delta = -20 \log_{10}(0.001) = 60.$$

$$M = \frac{A - 8}{2.285 \Delta\omega}$$

$$= \frac{60 - 8}{2.285(0.2\pi)} = 36.219 \approx 37 \quad \text{(rounding up)}.$$

$$\frac{M}{2} = 18.$$

$$h[n] = \frac{\sin(0.6\pi(n - \frac{M}{2})) - \sin(0.4\pi(n - \frac{M}{2}))}{\pi(n - \frac{M}{2})}$$

$\because \frac{M}{2} = 18 > 14$

$\therefore$ We can't use Kaiser window, b/c the group delay $\frac{M}{2}$ is too large.

f) No.

$$M = \frac{-10 \log_{10}(\delta_1 \delta_2) - 13}{2.324 \Delta\omega}$$

$$= \frac{-10 \log_{10}(0.01)(0.01) - 13}{2.324(0.2\pi)} = 32.2 \approx 33.$$

$\therefore \frac{M}{2} = 17 > 14.$

$\therefore$ We can't use Park-McLellan algorithm, b/c the group delay $\frac{M}{2}$ is too large.