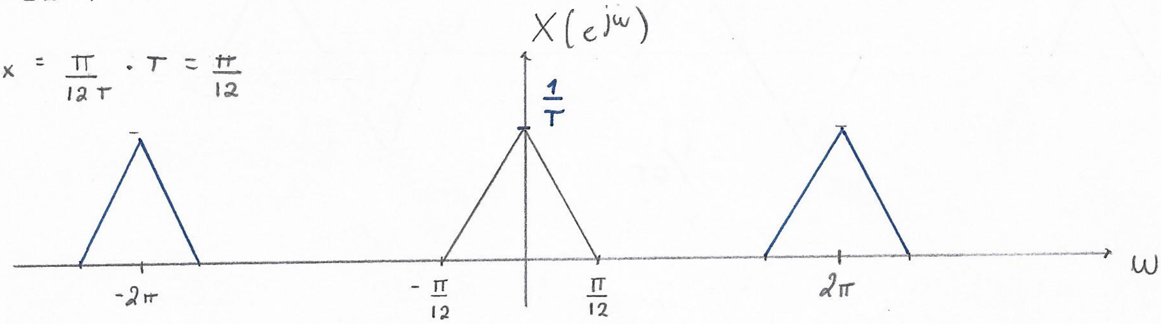
• IEE239 2016-2 e01 2)

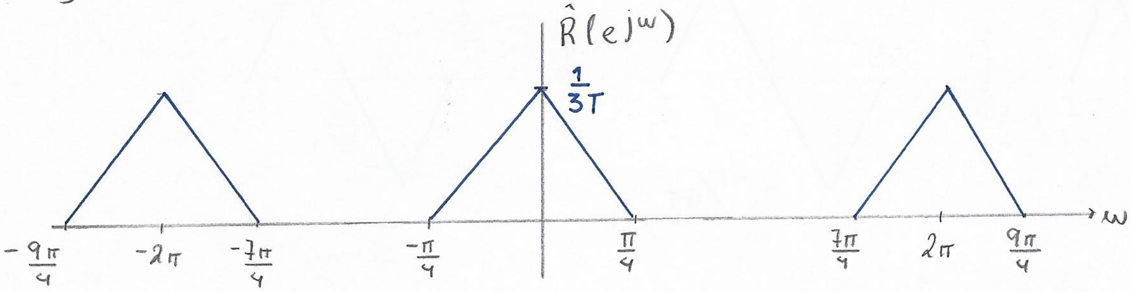
a) $w = \Omega \cdot T$

$\therefore \; w_{max} = \frac{\pi}{12T} \cdot T = \frac{\pi}{12}$



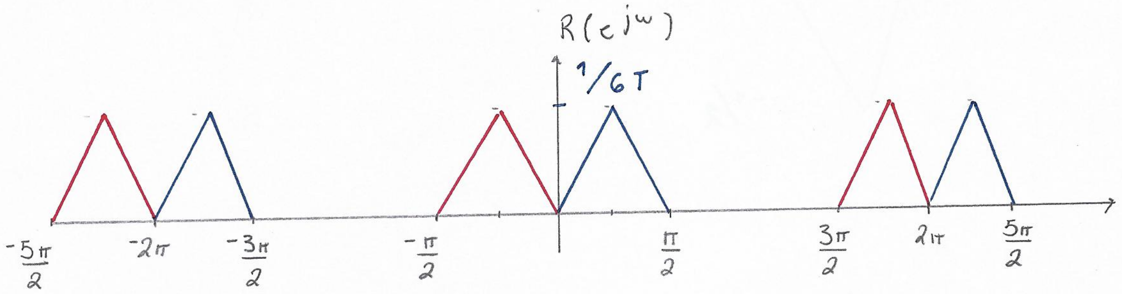
$\hat{r}[n] = x[3n]$

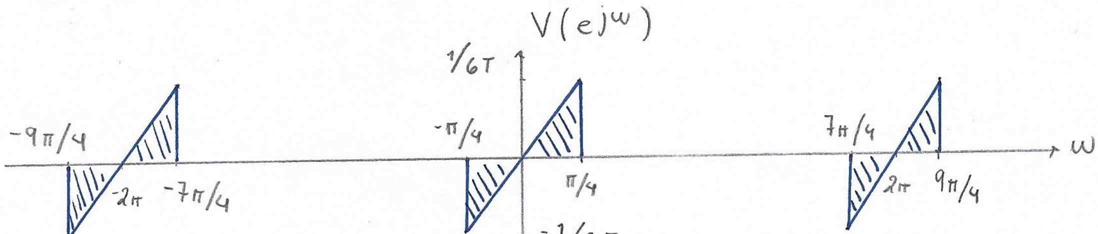
$$\hat{R}(e^{jw}) = \frac{1}{3}\left\{ X\left(e^{j\left(\frac{w}{3}\right)}\right) + X\left(e^{j\left(\frac{w-2\pi}{3}\right)}\right) + X\left(e^{j\left(\frac{w-4\pi}{3}\right)}\right) \right\}$$

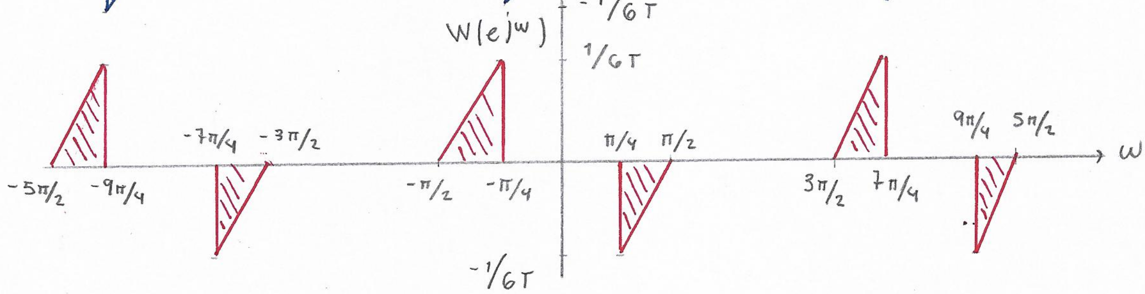


$$r[n] = \hat{r}[n] \cdot \cos\left(\frac{\pi}{4}n\right) = \frac{1}{2} e^{j\frac{\pi}{4}n}\, \hat{r}[n] + \frac{1}{2} e^{-j\frac{\pi}{4}n}\, \hat{r}[n]$$

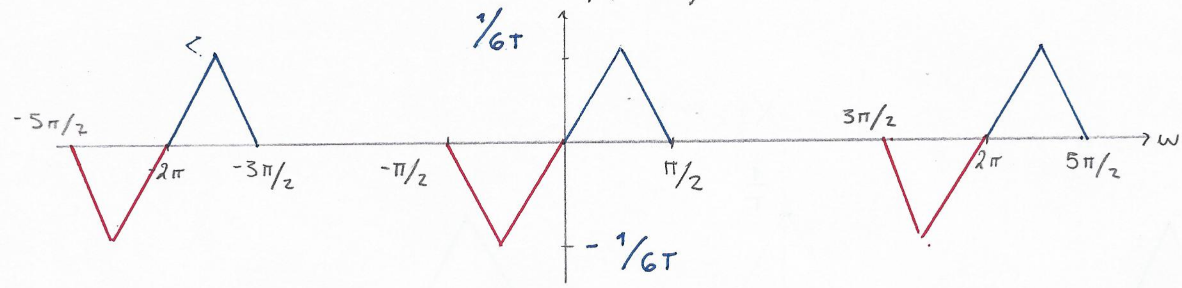
$$R(e^{jw}) = \frac{1}{2}\left\{ \hat{R}\left(e^{j\left(w-\frac{\pi}{4}\right)}\right) + \hat{R}\left(e^{j\left(w+\frac{\pi}{4}\right)}\right) \right\}$$







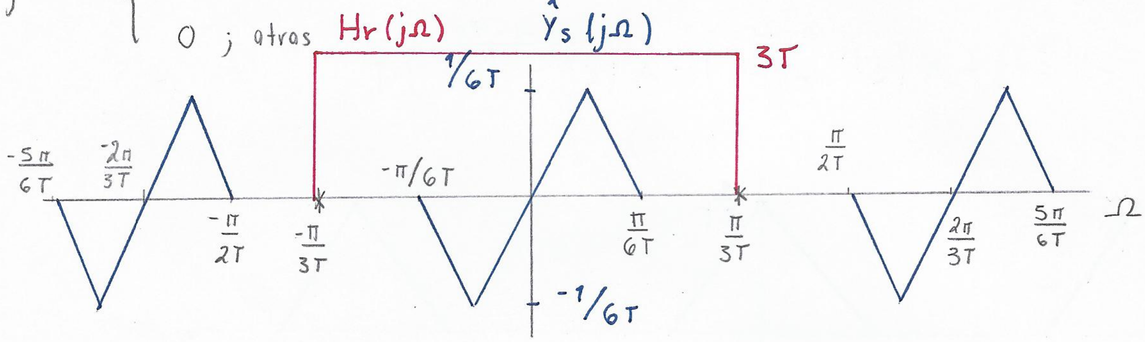
$Y(e^{j\omega}) = V(e^{j\omega}) - W(e^{j\omega})$



b)

* $\hat{Y}_s(j\Omega) \hat{=} Y(e^{j\omega})\Big|_{\omega=\Omega\cdot(3T)}$; $\therefore \Omega = \frac{\omega}{3T}$

* $H_r(j\Omega) = \begin{cases} 3T \; ; & |\Omega| \le \frac{\pi}{3T} \\ 0 \; ; & \text{otros} \end{cases}$



$Y_c(j\Omega) = \hat{Y}_s(j\Omega) \cdot H_r(j\Omega)$