

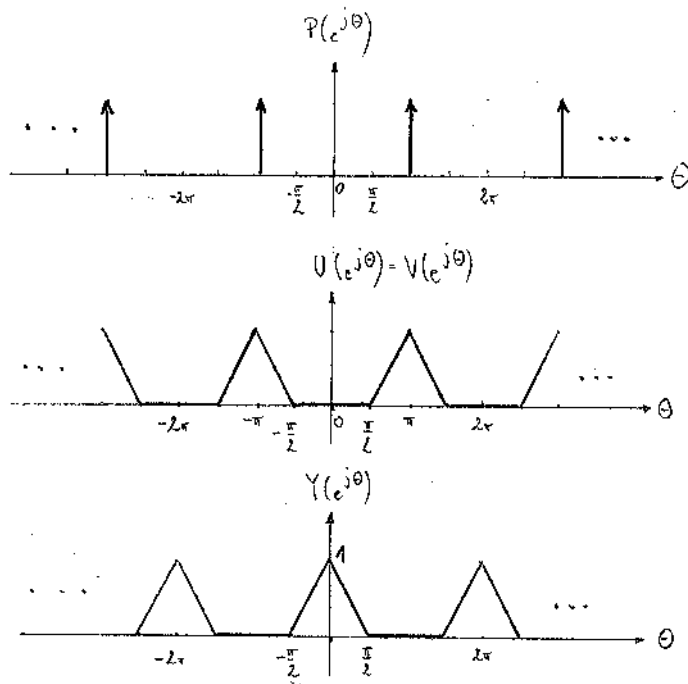
A3.6

$$(a) \quad p[n] = (-1)^n = e^{j\pi n} = \cos(\pi n) \Leftrightarrow 2\pi \delta_{2\pi}(\theta - \pi) = P(e^{j\theta})$$

$$u[n] = x[n] \cdot p[n] = e^{j\pi n} x[n] \Leftrightarrow X(e^{j(\theta - \pi)}) = U(e^{j\theta})$$

$$V(e^{j\theta}) = X(e^{j(\theta - \pi)}) \cdot H_{TP}(e^{j\theta}) = X(e^{j(\theta - \pi)})$$

$$y[n] = u[n] \cdot p[n] = e^{j\pi n} u[n] \Leftrightarrow V(e^{j(\theta - \pi)}) = X(e^{j(\theta - \pi)}) = X(e^{j\theta}) = Y(e^{j\theta})$$



$$(b) \quad Y(e^{j\theta}) = X(e^{j\theta}) = \text{tri}_{2\pi}\left(\frac{\theta}{\pi/2}\right) = \frac{2}{\pi} \cdot \text{rect}_{2\pi}\left(\frac{\theta}{\pi/2}\right) * \text{rect}_{2\pi}\left(\frac{\theta}{\pi/2}\right)$$

$$\frac{1}{2\pi} X_1(e^{j\theta}) * X_2(e^{j\theta}) \Leftrightarrow x_1[n] \cdot x_2[n]$$

$$\text{rect}_{2\pi}\left(\frac{\theta}{\pi/2}\right) \Leftrightarrow \frac{\sin\left(\frac{\pi}{4}n\right)}{\pi n}$$

$$y[n] = 4 \cdot \frac{\sin^2\left(\frac{\pi}{4}n\right)}{(\pi n)^2}$$