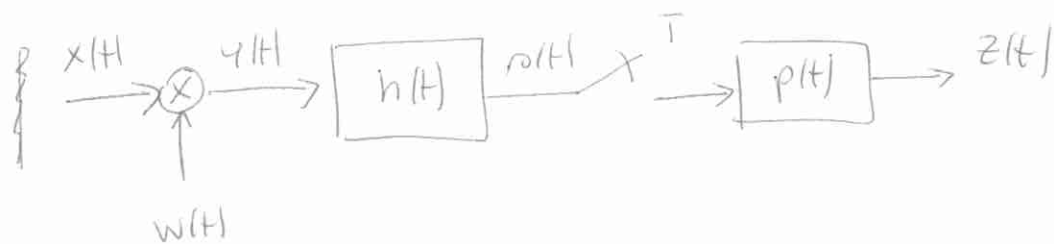


Soluzioni Esercizio 1 - Compito 14-11-2012



$$y(t) = x(t) \cdot w(t) =$$

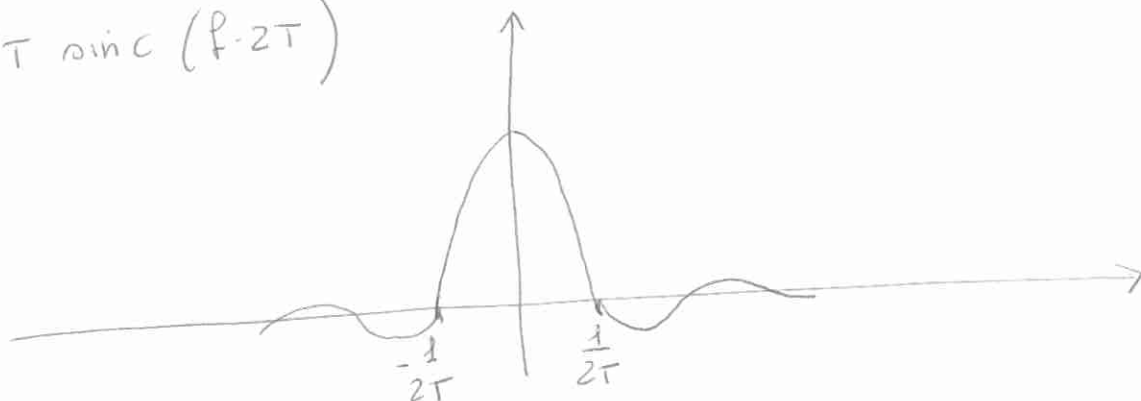
$$A \operatorname{rect}\left(\frac{t}{2T}\right) \left[\cos(2\pi f_0 t) \cos\varphi + \sin(2\pi f_0 t) \sin\varphi \right] \sin(2\pi f_0 t) =$$

$$= \frac{A}{2} \operatorname{rect}\left(\frac{t}{2T}\right) \sin(4\pi f_0 t) \cos\varphi + A \operatorname{rect}\left(\frac{t}{2T}\right) \sin\varphi \sin^2(2\pi f_0 t) =$$

$$= \frac{A}{2} \operatorname{rect}\left(\frac{t}{2T}\right) \sin(4\pi f_0 t) \cos\varphi + \frac{A}{2} \operatorname{rect}\left(\frac{t}{2T}\right) \sin\varphi +$$

$$\rightarrow \frac{A}{2} \operatorname{rect}\left(\frac{t}{2T}\right) \cos(4\pi f_0 t) \sin\varphi$$

$$H(f) = 2T \operatorname{sinc}(f \cdot 2T)$$



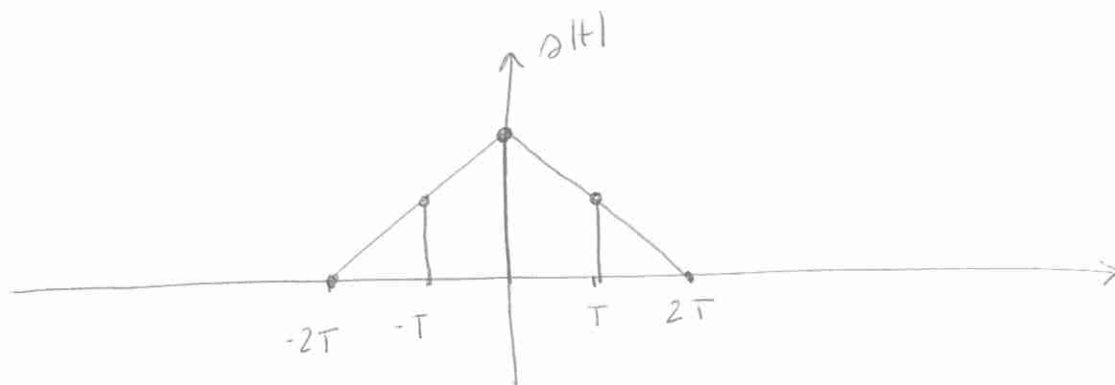
ipotesi che $f_0 \gg B$, $h(t)$ filtra le componenti di segnale ad alta frequenza e lascia passare la continua

quindi

$$s(t) = \frac{A}{2} \text{rect}\left(\frac{t}{2T}\right) \sin \varphi \otimes \text{rect}\left(\frac{t}{2T}\right) =$$

$$= \frac{A}{2} \sin \varphi \cdot 2T \left(1 - \frac{|t|}{2T}\right) \cdot \text{rect}\left(\frac{t}{4T}\right) =$$

$$= AT \sin \varphi \left(1 - \frac{|t|}{2T}\right) \text{rect}\left(\frac{t}{4T}\right)$$

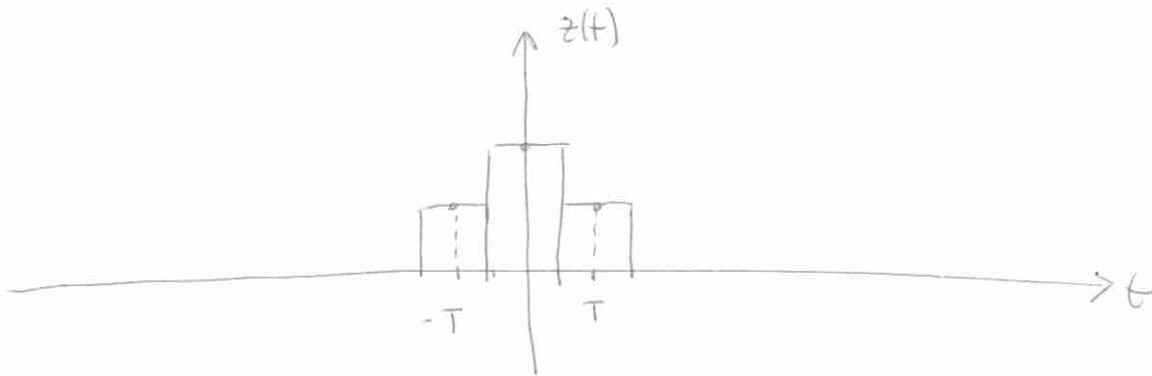


Il campionatore campiona a T secondi, quindi il segnale all'uscita del campionatore sarà

$$s_c(t) = \frac{AT}{2} \sin \varphi \delta(t+T) + AT \sin \varphi \delta(t) + \frac{AT}{2} \sin \varphi \delta(t-T)$$

$$z(t) = \rho_c(t) \otimes p(t) =$$

$$= \frac{AT}{2} \sin \varphi \, p(t+T) + AT \sin \varphi \, p(t) + \frac{AT}{2} \sin \varphi \, p(t-T)$$



$$E_z = \int z^2(t) dt = A^2 T^2 \sin^2 \varphi \left[\frac{1}{4} \cdot T + T + \frac{1}{4} \cdot T \right]$$

$$P_z = 0$$