

$$1) \quad x(t) = \sum_k x_0(t - kT_0)$$

$$x_0(t) = \text{rect}\left(\frac{t}{T_0/5}\right)$$

$$X_0(f) = \frac{T_0}{5} \text{sinc}\left(\frac{T_0}{5} f\right)$$

$$X_n = \frac{1}{T_0} \cancel{\text{sinc}} X_0\left(\frac{n}{T_0}\right) = \frac{1}{5} \text{sinc}\left(\frac{n}{5}\right)$$

$$X(f) = \sum_n X_n \delta\left(f - \frac{n}{T_0}\right)$$

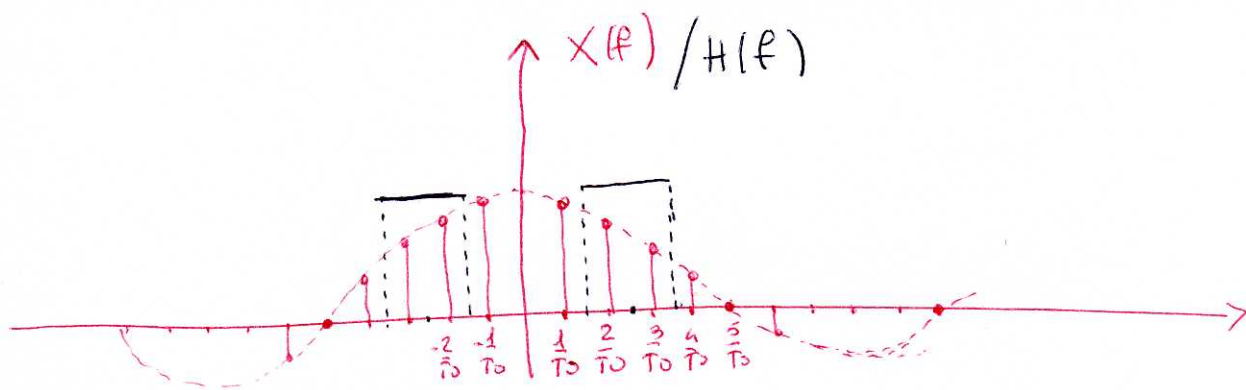
2)

$$h(t) = \frac{4}{T_0} \text{sinc}\left(\frac{2}{T_0} t\right) \cos\left(5\pi \frac{t}{T_0}\right) = \frac{4}{T_0} \text{sinc}\left(\frac{2}{T_0} t\right) \cos\left(2\pi t \frac{5}{2T_0}\right)$$

$$H(f) = \text{rect}\left(\frac{T_0}{2} f\right) \otimes \left[\delta(f - f_0) + \delta(f + f_0) \right] =$$

$$\boxed{f_0 = \frac{5}{2T_0}}$$

$$= \text{rect}\left(\frac{T_0}{2} \left(f - \frac{5}{2T_0}\right)\right) + \text{rect}\left(\frac{T_0}{2} \left(f + \frac{5}{2T_0}\right)\right)$$



$$Y(f) = \frac{1}{5} \text{sinc}\left(\frac{2}{5}\right) \left[\delta\left(f - \frac{2}{T_0}\right) + \delta\left(f + \frac{2}{T_0}\right) \right] +$$

$$\frac{1}{5} \text{sinc}\left(\frac{3}{5}\right) \left[\delta\left(f - \frac{3}{T_0}\right) + \delta\left(f + \frac{3}{T_0}\right) \right]$$

$$y(t) = \frac{2}{5} \text{sinc}\left(\frac{2}{5}\right) \cos\left(2\pi t \frac{2}{T_0}\right) + \frac{2}{5} \text{sinc}\left(\frac{3}{5}\right) \cos\left(2\pi t \frac{3}{T_0}\right)$$

$$\bar{Y}(f) = \frac{2}{T_0} \sum_k Y\left(f - \frac{2}{T_0} k\right)$$

$$P(f) = \text{rect}\left(\frac{T_0}{3} f\right)$$

$$Z(f) = P(f) \bar{Y}(f) = \frac{4}{T_0} \text{sinc}\left(\frac{2}{5}\right) \delta(f) + \frac{4}{T_0} \text{sinc}\left(\frac{3}{5}\right) \left[\delta\left(f - \frac{1}{T_0}\right) + \delta\left(f + \frac{1}{T_0}\right) \right]$$

$$z(t) = \frac{4}{T_0} \text{sinc}\left(\frac{2}{5}\right) + \frac{2}{T_0} \text{sinc}\left(\frac{3}{5}\right) \cos\left(2\pi t \cdot \frac{1}{T_0}\right)$$

$$3) E_z = +\infty$$

perché e^- un segnale periodico

$$P_z = \int_{-\infty}^{+\infty} |z(f)|^2 df =$$

$$= \left(\frac{L_1}{T_0} \operatorname{sinc} \left(\frac{2}{5} \right) \right)^2 + 2 \cdot \left(\frac{4}{T_0} \operatorname{sinc} \left(\frac{3}{5} \right) \right)^2$$