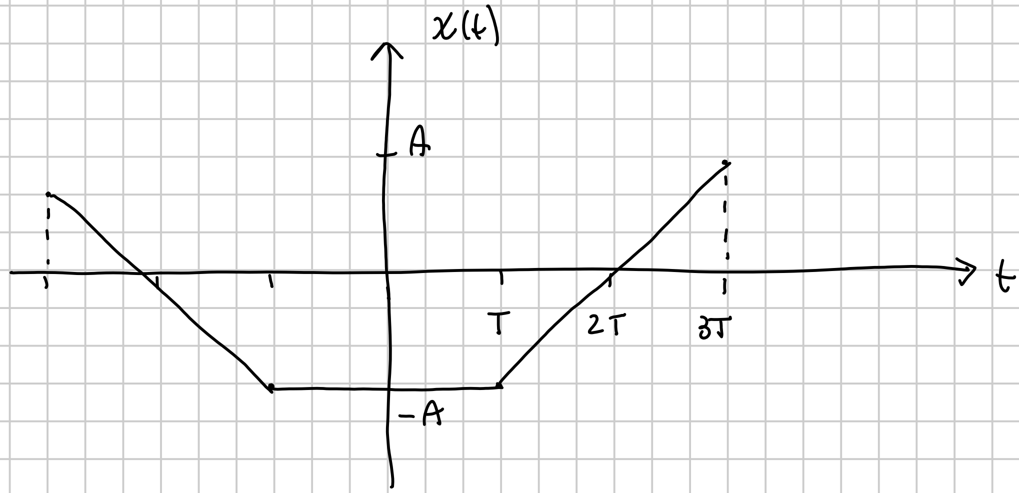
FILA A

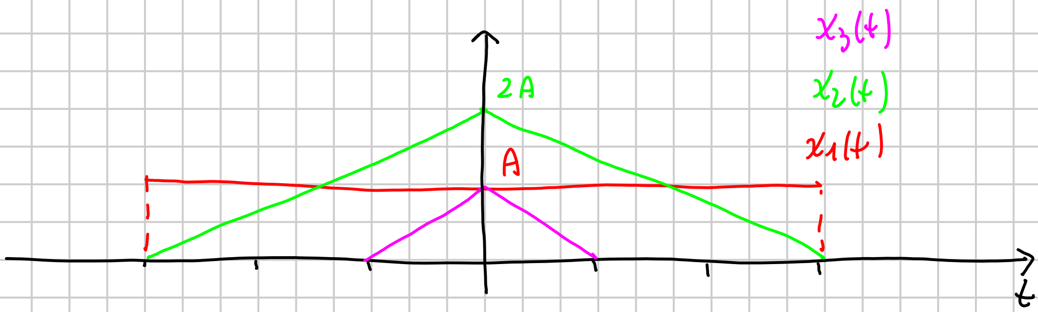


Si può risolvere in due modi:

1) Notando che $x(t) = x_1(t) + x_2(t) + x_3(t)$

2) teorema della derivazione

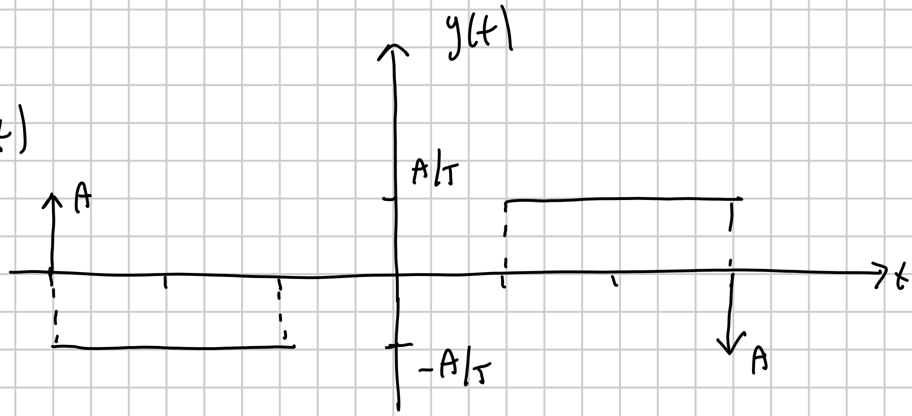
1 $$x(t) = A\,\mathrm{rect}\left(\frac{t}{6T}\right) - 2A\left(1 - \frac{|t|}{3T}\right)\mathrm{rect}\left(\frac{t}{6T}\right) + A\left(1 - \frac{|t|}{T}\right)\mathrm{rect}\left(\frac{t}{2T}\right)$$



$$X(f) = 6TA\,\mathrm{sinc}(f6T) - 6AT\,\mathrm{sinc}^2(f3T) + TA\,\mathrm{sinc}^2(fT)$$

(2)

$$y(t) = \frac{d}{dt}\, x(t)$$



$$\int_{-\infty}^{+\infty} y(t)\, dt = 0 \quad \Rightarrow \quad Y(f) = j2\pi f\, X(f)$$

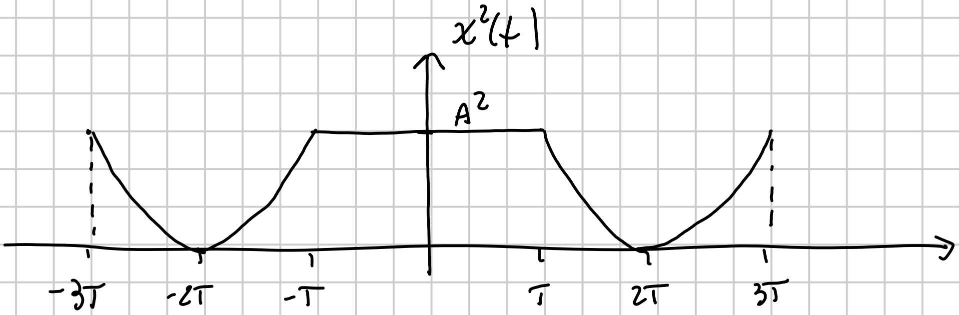
$$X(f) = \frac{Y(f)}{j2\pi f}$$

$$y(t) = A\,\delta(t+3T) - A\,\delta(t-3T) - \frac{A}{T}\,\text{rect}\left(\frac{t+2T}{2T}\right) + \frac{A}{T}\,\text{rect}\left(\frac{t-2T}{2T}\right)$$

$$Y(f) = 2jA\,\sin(2\pi f 3T) - 2jA\,\text{sinc}(f2T)\,\sin(2\pi f 2T)$$

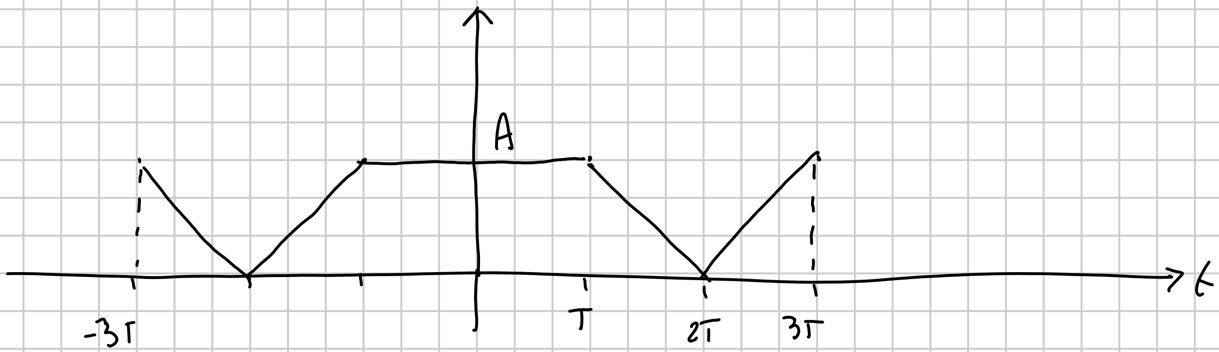
$$X(f) = 6TA\,\text{sinc}(f3T) - 4T\,\text{sinc}^2(f2T)$$

Segnale ad energia finita poiché non ci sono componenti periodiche e potenza nulla.



$$E_x = 4\left(\frac{1}{3}\cdot T\cdot A^2\right) + 2TA^2 = TA^2\left(\frac{4}{3}+2\right) = \frac{10}{3}\,TA^2$$

FILA B



$$x(t) = A\,\mathrm{rect}\left(\frac{t}{6T}\right) - A\left(1 - \frac{|t+2T|}{T}\right)\mathrm{rect}\left(\frac{t+2T}{2T}\right) -$$

$$- A\left(1 - \frac{|t-2T|}{T}\right)\mathrm{rect}\left(\frac{t-2T}{2T}\right)$$

$$X(f) = 6AT\,\mathrm{sinc}(f6T) - AT\,\mathrm{sinc}^2(fT)\,e^{j2\pi f 2T} - AT\,\mathrm{sinc}^2(fT)\,e^{-j2\pi f 2T}$$

$$= 6TA\,\mathrm{sinc}(f6T) - 2AT\,\mathrm{sinc}^2(fT)\cos(2\pi f 2T)$$

Oppure si può risolvere con il teorema della derivazione

$$E_x = \frac{10}{3} A^{2T}$$

$$P_x = 0$$