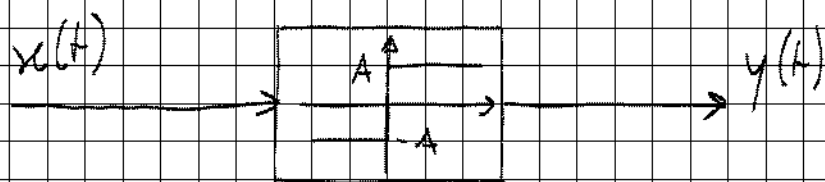


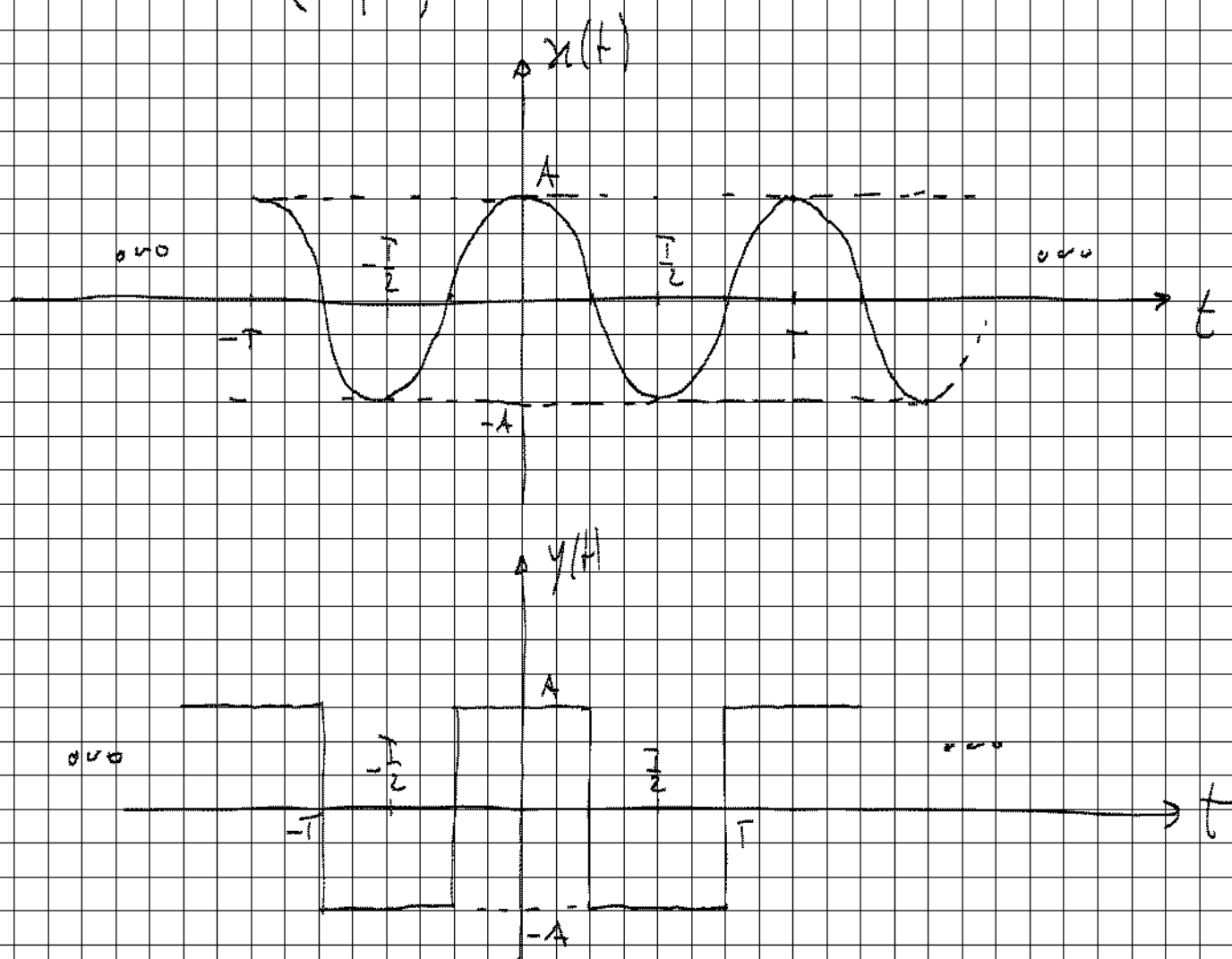
ESERCIZIO



Calcolare i coefficienti di distorsione D_2 , D_3 e D .

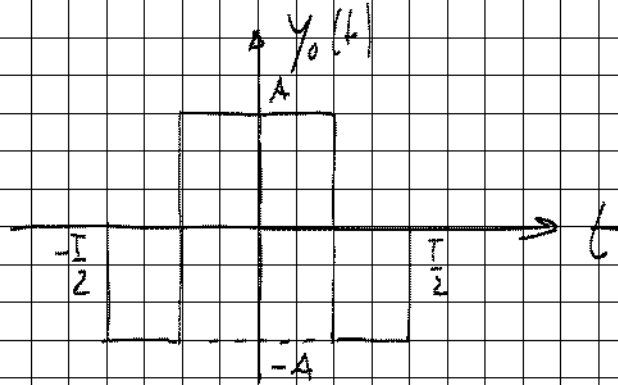
Soluzione

$$x(t) = A \cos(2\pi f_0 t)$$



$$Y_k = \frac{1}{T} Y_0\left(\frac{k}{T}\right)$$

$$Y_0(p) \xLeftrightarrow{\text{TCF}} y_0(t)$$



$$y_0(t) = 2A \operatorname{rect}\left(\frac{t}{T/2}\right) - A \operatorname{rect}\left(\frac{t}{T}\right)$$

$$Y_0(f) = AT \operatorname{sinc}\left(\frac{T}{2}f\right) - AT \operatorname{sinc}(Tf)$$

$$Y_k = A \left[\operatorname{sinc}\left(\frac{k}{2}\right) - \operatorname{sinc}(k) \right]$$

$$y(t) = \sum_k Y_k e^{j2\pi k \frac{t}{T}} = Y_0 + \sum_{k \neq 0} Y_k e^{j2\pi k \frac{t}{T}}$$

$$= Y_0 + 2 \sum_{k=1}^{\infty} Y_k \cos\left(2\pi k \frac{t}{T}\right) \quad (\text{poiché } Y_k = Y_{-k} = Y_k^*)$$

$$D_2 = \sqrt{\frac{P_2}{P_1}} = \sqrt{\frac{(2Y_2)^2/2}{(2Y_1)^2/2}} = \frac{|Y_2|}{|Y_1|} = \frac{0}{\frac{2A}{\pi}} = 0$$

$$D_3 = \sqrt{\frac{P_3}{P_1}} = \frac{|Y_3|}{|Y_1|} = \frac{\frac{2A}{3\pi}}{\frac{2A}{\pi}} = \frac{1}{3}$$

$$D = \sqrt{\frac{P_T - Y_0^2 - 2Y_2^2}{2Y_1^2}} = \sqrt{\frac{A^2 - 0 - 2 \cdot \left(\frac{2A}{\pi}\right)^2}{2 \left(\frac{2A}{\pi}\right)^2}} = \sqrt{\frac{\pi^2}{8} - 1}$$