2° Mini TESTE

1. $x(t) = 1 + 3\cos(22\pi t - \pi/3)$ — Sinusoidal e periodico

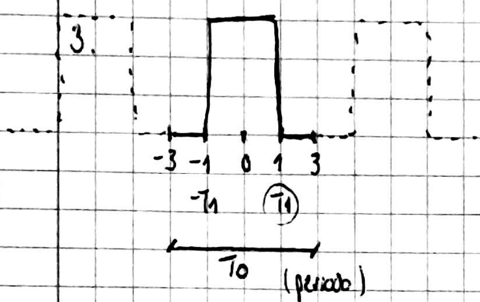
$= 1 + 3\cos(2\pi\, 11\, t - \pi/3)$ $\quad f_0 = 11$ Hz (freq. fundamental)

2. $x(t) = 1 + 3\cos(2\pi\, \frac{2}{5}\, t + \pi/4) + 2\cos(2\pi\, \frac{4}{3}\, t - \pi/4)$ — Ñ sinusoidal e periodico.

$f_1 = 2/5$, $f_2 = 4/3$ $\rightarrow f_0 = \text{mdc}\left(\frac{2}{5}, \frac{4}{3}\right) = \text{mdc}\left(\frac{2\times\cancel{5}\times 3}{\cancel{5}}, \frac{4}{\cancel{3}}\times 5\times\cancel{3}\right)\times\frac{1}{5}\times\frac{1}{3} =$

$= \text{mdc}(6, 20)\times 1/5 \times 1/3 = 2 \times 1/5 \times 1/3 = 0{,}133\ldots$

3.



$X_k = \frac{2T_1}{T_0}\,\text{sinc}\left(k\,\frac{2T_1}{T_0}\right)$, $\quad A = \frac{2T_1}{T_0}$

$B = 2T_1$

$X_k = A\,\text{sinc}\left(\frac{Bk}{C}\right)$ $\quad C = T_0$

$T_1 = 1$

$T_0 = 6$

$\rightarrow X_k = \frac{2\times 1}{6}\,\text{sinc}\left(k\,\frac{2\times 1}{6}\right) = 0{,}333\ldots \times \text{sinc}\left(k\,\frac{2}{6}\right)$

$\rightarrow T_0 = \frac{1}{f_0} \Leftrightarrow 6 = \frac{1}{f_0} \Leftrightarrow f_0 = 0{,}167$ Hz

$\text{sinc}(t) = \frac{\sin(\pi t)}{\pi t}$ $\quad\rightarrow f = k\,f_0 \Rightarrow f = 6\times 0{,}167 \approx \underline{\underline{1\text{ Hz}}}$

$z(t) = 2 + 5x(t - T_0/3)$, $\quad z_0 = D$ e $z_k = E\,\text{sinc}\left(\frac{Fk}{G}\right)e^{j2\pi k H}$

Eq.	Coef.
$x(t - T_0/3)$	$X_k e^{-j\omega_0 k t_0} = X_k e^{+j\omega_0 k(-T_0/3)} = X_k e^{+j\omega_0 k T_0/3}$
$5\times x(t - T_0/3)$	$5\times X_k e^{\cdots}$
$2 + x(t - T_0/3)$	$2 + 5\times X_k e^{\cdots}$

$\downarrow$

$2 + 5\times\frac{2}{6}\,\text{sinc}\left(k\,\frac{2\times 1}{6}\right)\times e^{+j\omega_0 k T_0/3} =$

$\omega_0 = \frac{2\pi}{T_0}$ $\quad = 2 + \overset{E}{\frac{10}{6}}\times\text{sinc}\left(k\times 2\times\frac{1}{6}\right)\times e^{\underbrace{-j\frac{2\pi}{T_0}k\frac{T_0}{3}}} = \quad \rightarrow -\frac{2\pi}{\cancel{T_0}}\,k\,\frac{\cancel{T_0}}{3} = -2\pi\,k\,\overset{H}{\frac{1}{3}}$

$= 2 + \frac{10}{6}\times\text{sinc}\left(k\,\frac{1}{3}\right)\times e^{-j2\pi k\,1/3}$

4. $x(t) = 1 - 2\frac{|t|}{T_0}$ se $|t| < \frac{T_0}{2}$, $T_0 = 6$ s

Metendo a eq. no Wolfram vê-se que o que se mais aproxima é o triangular 2.

$X_0 = 0,5$

$X_k = \frac{1}{k^2 \pi^2}(1-(-1)^k)$, $X_k = \frac{B}{C k^a \pi^b}(1-(-1)^k)$

1   1   2   2

→ $T_0 = \frac{1}{f_0} \Leftrightarrow 6 = \frac{1}{f_0} \Leftrightarrow f_0 = 0,1666..$ Hz

→ $f = k f_0 \Leftrightarrow f = 3 \times 0,1666 = 0,5$ Hz

$y(t) = 1 + 3x(t + T_0/3)$, $Y_k = \frac{D}{E k^c \pi^d} e^{-j 2\pi k G}$

$Y_0 = 1 + 3 \times X_0 = 1 + 3 \times 0,5 = 2,5$ Hz

$\omega_0 = \frac{2\pi}{T_0}$

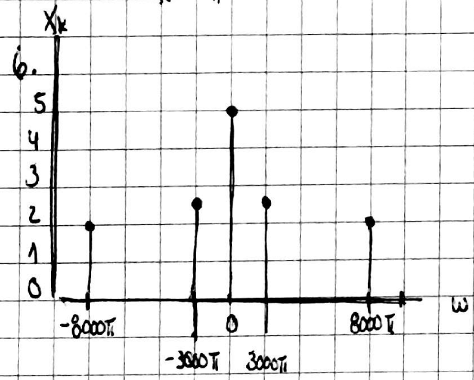
Eq.	Coef.
$x(t)$	X_k
$x(t+T_0/3)$	$X_k e^{-j\omega_0 k T_0/3}$
$3 \times x(t+T_0/3)$	$3 \times X_k e^{\cdots}$
$1+3x(t+T_0/3)$	$1+3 \cdot X_k e^{\cdots}$

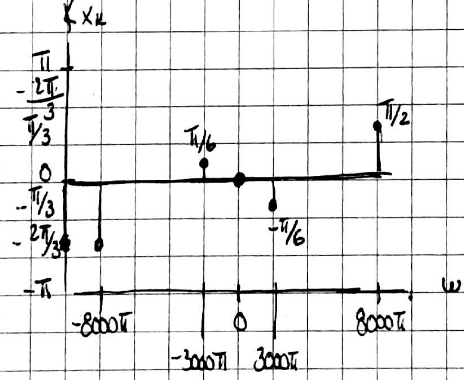
$\longrightarrow 1 + 3 \frac{1}{k^2\pi^2}(1-(-1)^k) e^{-j\omega_0 k T_0/3} =$

$= 1 + \frac{3}{k^2\pi^2}(1-(-1)^k) e^{-j 2\pi k 1/3}$

$-j\omega_0 k \frac{T_0}{3} = -j \frac{2\pi}{\cancel{T_0}} k \frac{\cancel{T_0}}{3} =$

6.





$x(t) = 5 + 5\cos(3000\pi t - \frac{\pi}{6}) + 4 \cdot \cos(8000\pi t + \frac{\pi}{2})$