

26/4/2012

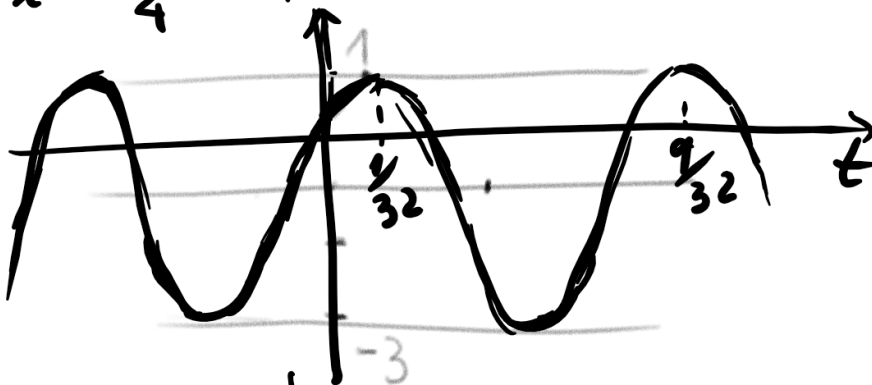
1- $x(t) = -1 + 2 \cos(2\pi 4t - \pi/4)$

$y(t) = x(t) - 4 \sin(2\pi 10t) =$

$= -1 + 2 \cos(2\pi 4t - \pi/4) - 4 \cos(2\pi 10t - \pi/2)$

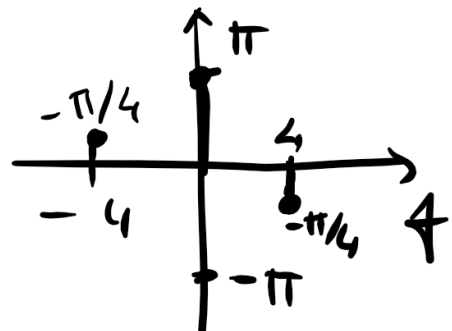
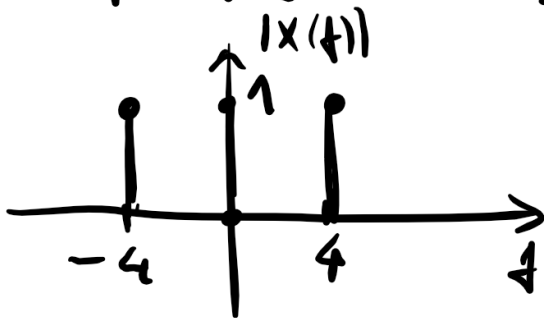
$= -1 + 2 \cos(2\pi 4t - \pi/4) + 4 \cos(2\pi 10t + \pi/2)$

a) $T_x = \frac{1}{4} = 0,25 \text{ s}$



b) $x_0 = 1 = 1 e^{j\pi}$
 $x_1 = 1 e^{-j\pi/4}$

$x_{-1} = 1 e^{j\pi/4}$



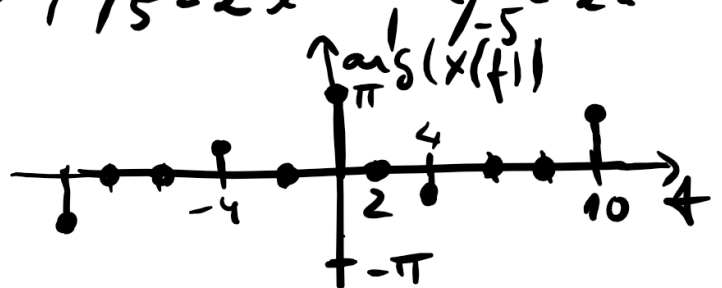
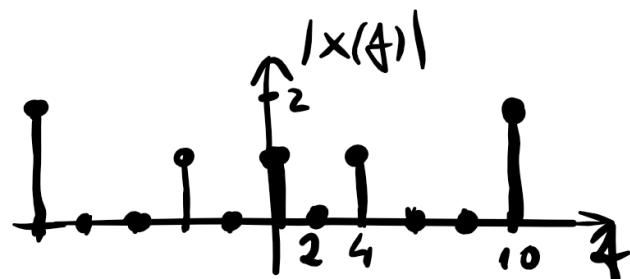
c) $f_y = \text{mdc}\{4, 10\} = 2 \text{ Hz}$

$y_0 = 1 e^{j\pi}$

$y_1 = 0, y_{-1} = 0, y_2 = 1 e^{-j\pi/4}, y_{-2} = 1 e^{j\pi/4}$

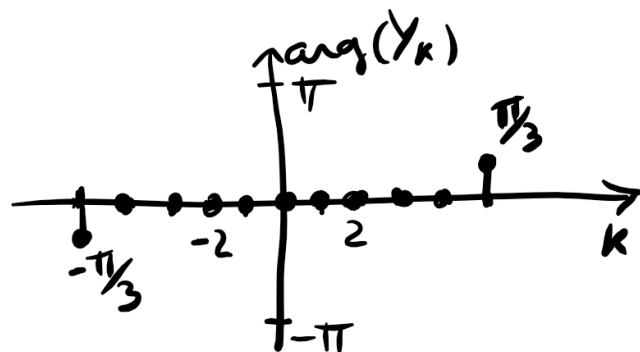
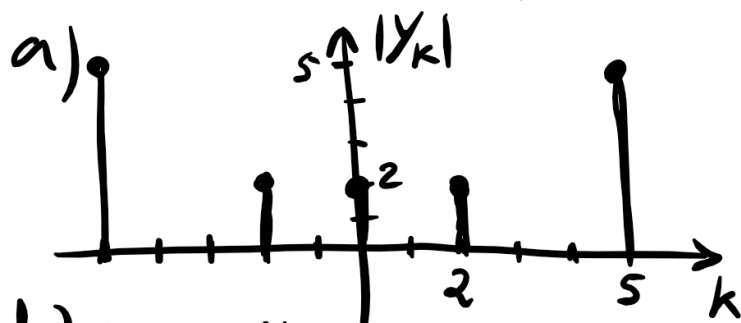
$y_3 = y_{-3} = y_4 = y_{-4} = 0, y_5 = 2 e^{j\pi/2}, y_{-5} = 2 e^{-j\pi/2}$

$\begin{array}{c|c} 4 & 2 \\ \hline 2 & 2 \\ \hline 1 & 1 \end{array} \quad \begin{array}{c|c} 10 & 2 \\ \hline 5 & 2 \\ \hline 1 & 1 \end{array}$



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$$2- Y_k = \begin{cases} 2 & k=0, k=2, k=-2 \\ 5e^{j\pi/3} & k=5 \\ 5e^{-j\pi/3} & k=-5 \end{cases}$$



b) $f_0 = 10 \text{ Hz}$

$$y(t) = 5e^{j(2\pi(10)5t + \pi/3)} + 5e^{-j(2\pi(10)5t + \pi/3)} + 2e^{j2\pi(10)2t} + 2e^{-j2\pi(10)2t} + 2 =$$

$$= 10 \cos(2\pi(10)5t + \pi/3) + 4 \cos(2\pi(10)2t) + 2$$

$$= 2 + 4 \cos(2\pi 20t) + 10 \cos(2\pi 50t + \pi/3)$$

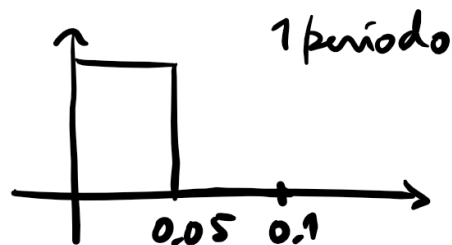
c) $P_y = \sum |Y_k|^2 = 2^2 + 2^2 + 2^2 + 5^2 + 5^2 = 62 \text{ W}$

3- na tabela tem-se



$$T_n = 0.025$$

$$T_0 = 0.1 \quad f_0 = 10$$

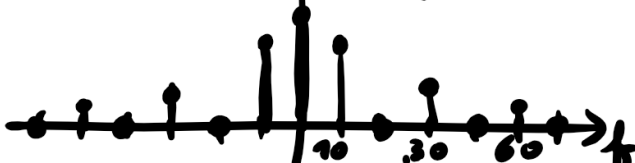


$$Z_k = \frac{2 \times 0.025}{0.1} \text{sinc}\left(k \frac{2 \times 0.025}{0.1}\right) = 0.5 \text{sinc}(0.5k)$$

$$Z_0 = 0.5, \quad Z_1 = 0.5 \text{sinc}(0.5) = 0.318, \quad Z_2 = 0,$$

$$Z_3 = -0.106 = 0.106 e^{j\pi}, \quad Z_4 = 0, \quad Z_5 = 0.0637, \quad Z_6 = 0$$

$|Z_k|$



$\arg(Z_k)$

