

# Resolvidos

1

$$f_1 = 10 \text{ Hz} \quad f_2 = 20 \text{ Hz} \Rightarrow F_0 = \text{mdc}(10, 20) = 10 //$$

$$y(t) = 10 + 14 \cos(20\pi t - \pi/3) + 8 \cos(40\pi t + \pi/2)$$

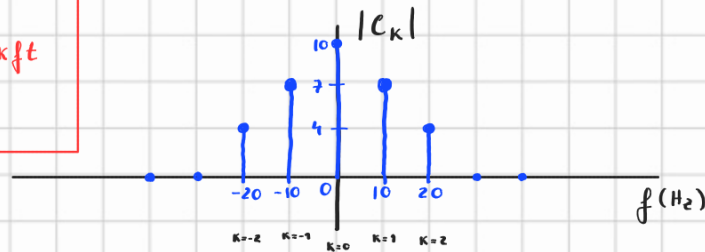
$$y(t) = 10 + 14 \times \frac{e^{j20\pi t - j\pi/3} + e^{-j20\pi t + j\pi/3}}{2} + 8 \times \frac{e^{j40\pi t + j\pi/2} + e^{-j40\pi t - j\pi/2}}{2}$$

$$= 10 + \underbrace{7}_{C_0} e^{j2\pi(10)t} e^{-j\pi/3} + \underbrace{7}_{C_{-1}} e^{j2\pi(-10)t} e^{-j\pi/3} + \underbrace{4}_{C_2} e^{j2\pi(20)t} e^{j\pi/2} + \underbrace{4}_{C_{-2}} e^{j2\pi(-20)t} e^{j\pi/2}$$

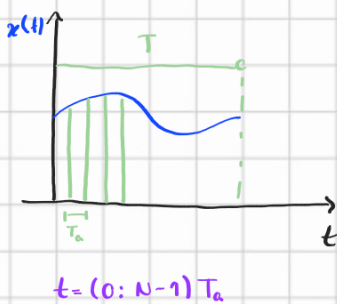
$f=0 \text{ Hz} \quad f=10 \text{ Hz} \quad f=-10 \text{ Hz} \quad f=20 \text{ Hz} \quad f=-20 \text{ Hz}$

$$\cos(\theta) = \frac{e^{j\theta} + e^{-j\theta}}{2}$$

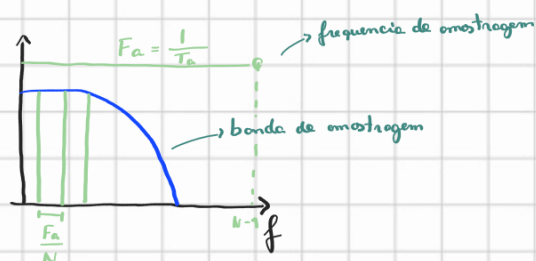
$$y(t) = \sum_{k=-K}^K c_k e^{j2\pi k f t}$$



2



$\Rightarrow$



$$f = (0:N-1) \frac{F_a}{N}$$

$$\begin{aligned} k=0, & \text{Freq.} \rightarrow 0 \\ k=1, & \text{Freq.} \rightarrow \frac{F_m}{N} \\ k=2, & \text{Freq.} \rightarrow 2 \frac{F_m}{N} \\ & \vdots \\ k=N-1, & \text{Freq.} \rightarrow (N-1) \frac{F_m}{N} \end{aligned}$$

Se quiséssemos centrar em 0:

$$[0, F_a] \rightarrow \left[-\frac{F_a}{2}, \frac{F_a}{2}\right]$$

$$\Rightarrow f = (0:N-1) \frac{F_a}{N} - \frac{F_a}{2}$$

$$X_f = \text{fftshift}(\text{fft}(x(t))) \times \frac{1}{N}$$

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$$x_t = \text{ifft}(\text{ifftshift}(X_f)) \times N$$