

# Camada Física da Computação

Aula 16 – Fourier

2021 – Engenharia da computação

Rodrigo Carareto

# Transformada de Fourier

**Joseph Fourier**

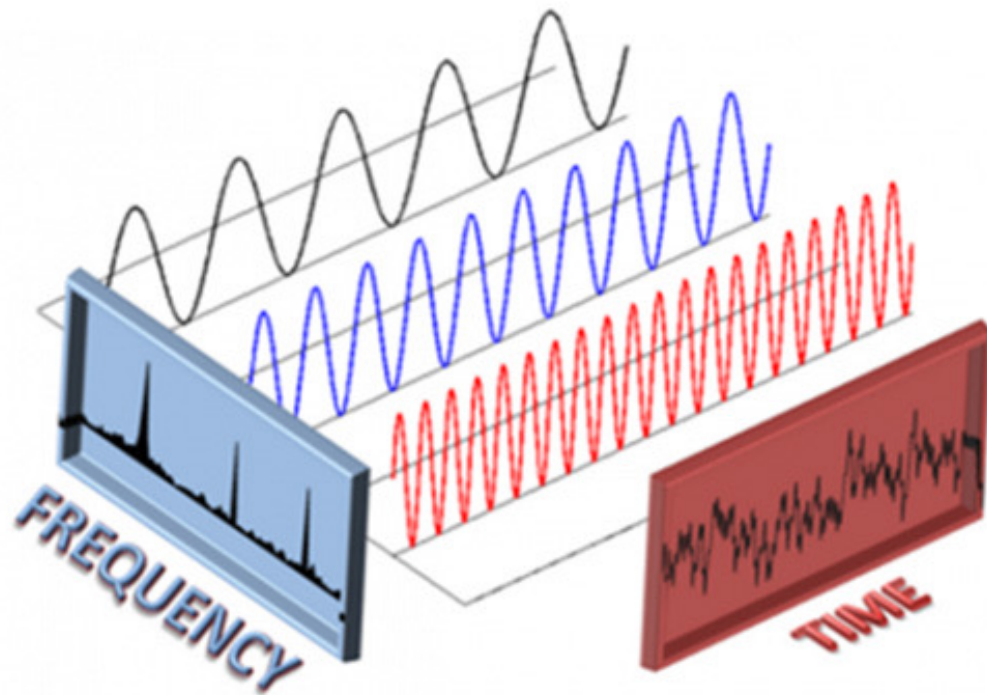


Jean-Baptiste Joseph Fourier

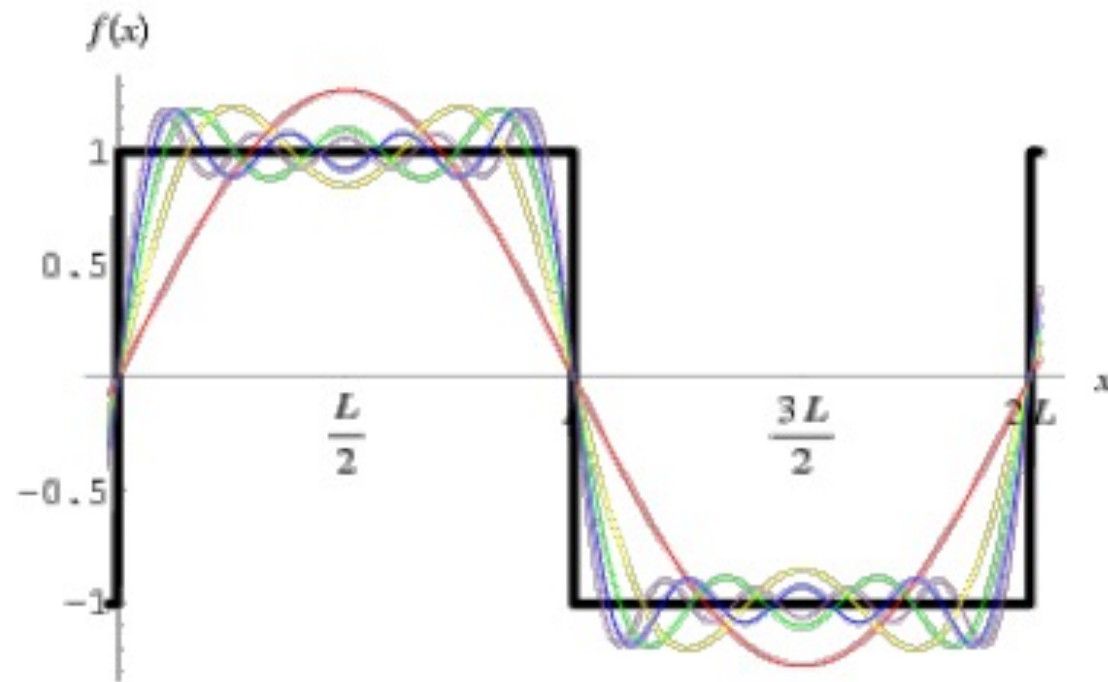
**Born** 21 March 1768  
Auxerre, Burgundy, Kingdom of France (now in Yonne, France)

**Died** 16 May 1830 (aged 62)  
Paris, Kingdom of France

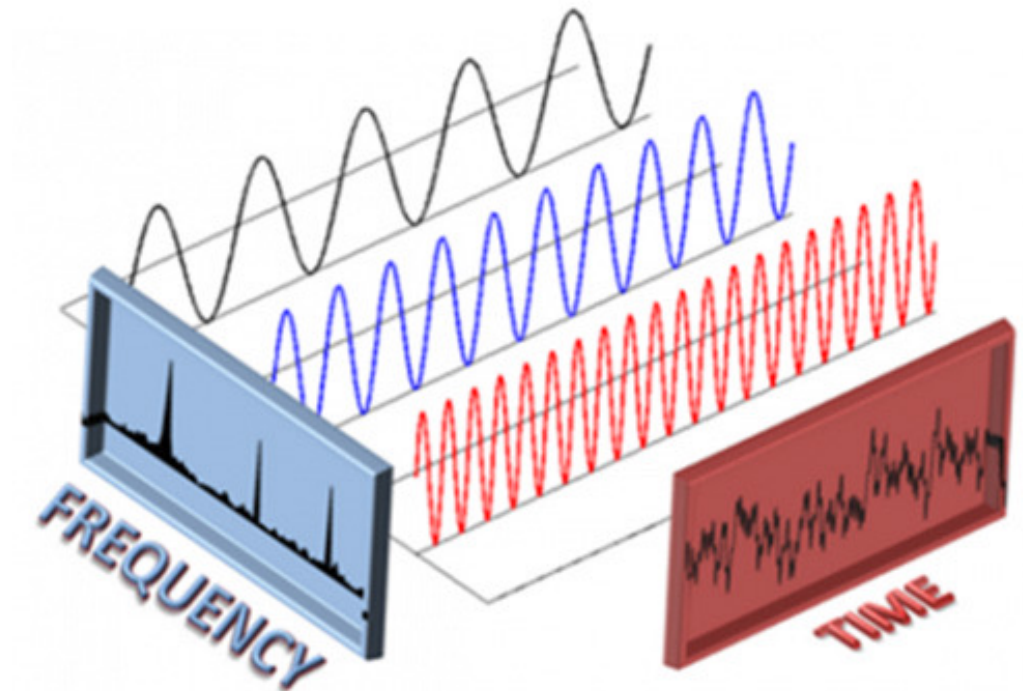
**Nationality** French



# Transformada de Fourier

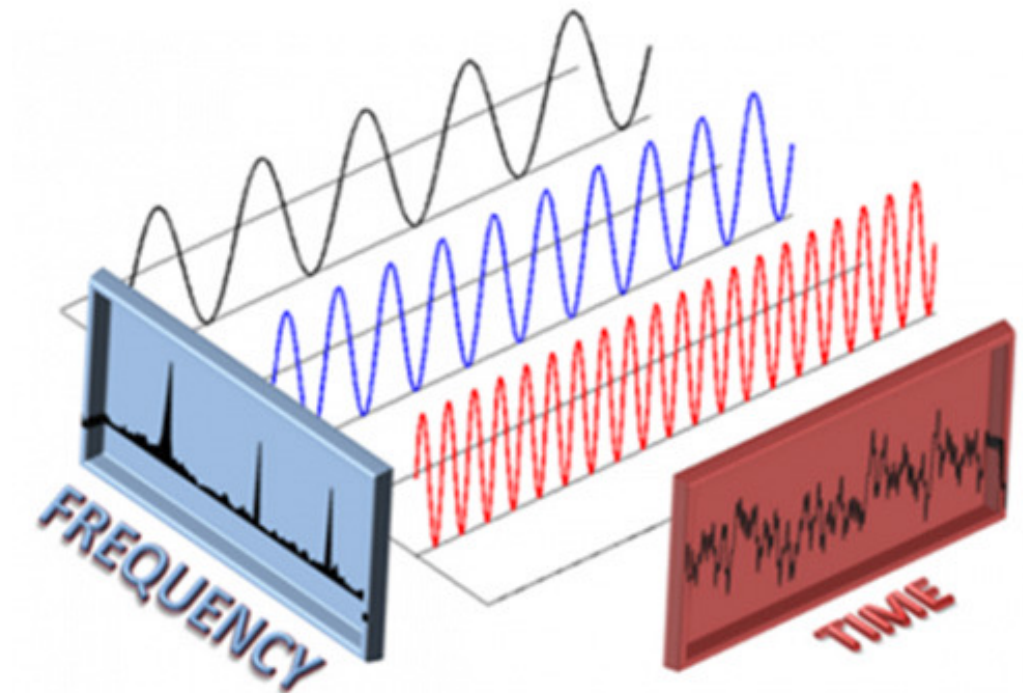


# A transformada de Fourier



Como saber a amplitude e fase de todas as senoide que ando somadas compõem o sinal?

# A transformada de Fourier



$$\hat{f}(\omega) = \int_{-\infty}^{+\infty} f(t) \cdot e^{-j\omega t} dt$$

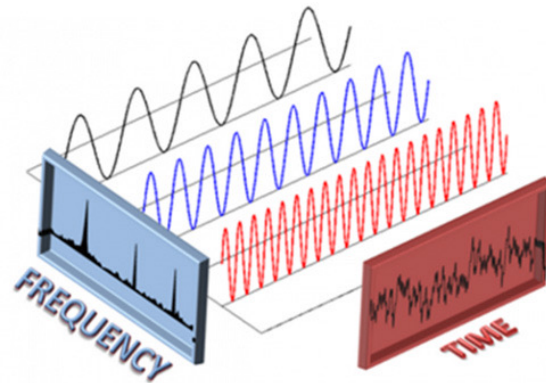
$$\hat{X}[k] = \sum_{n=0}^{N-1} x[n] \cdot e^{\frac{-jkn}{N}}$$

# Transformada de Fourier

*lista de reais → lista de complexos*

$$\hat{f}(\omega) = \int_{-\infty}^{+\infty} f(t) \cdot e^{-j\omega t} dt$$

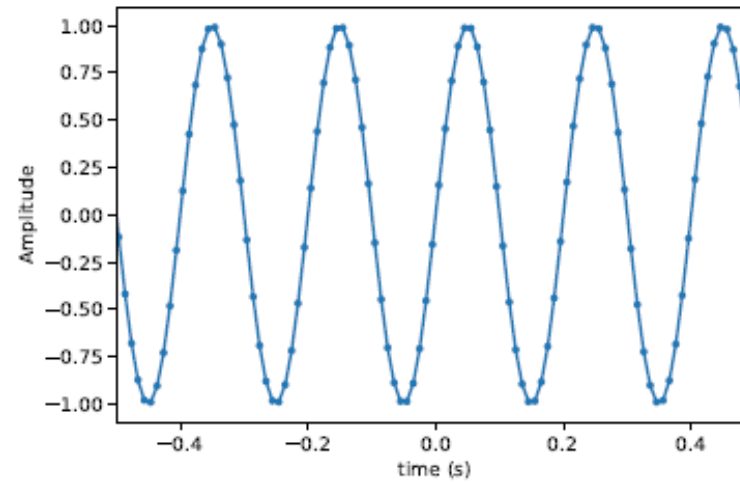
$$\hat{X}[k] = \sum_{n=0}^{N-1} x[n] \cdot e^{-\frac{jkn}{N}}$$



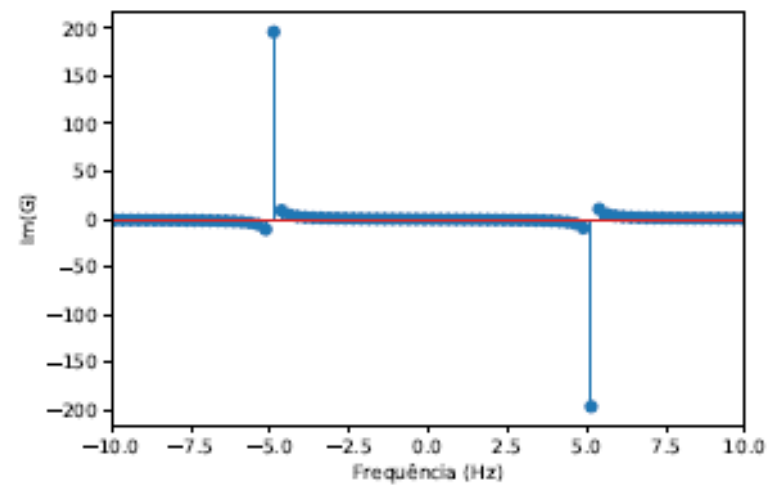
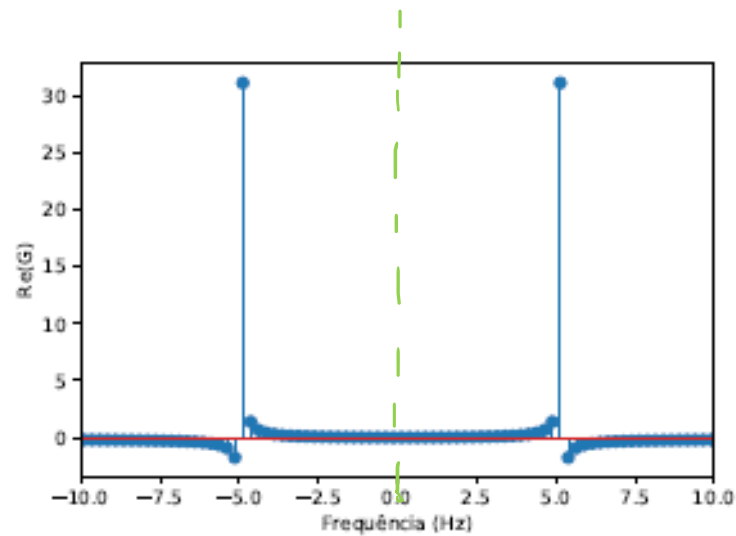


## PYTHON

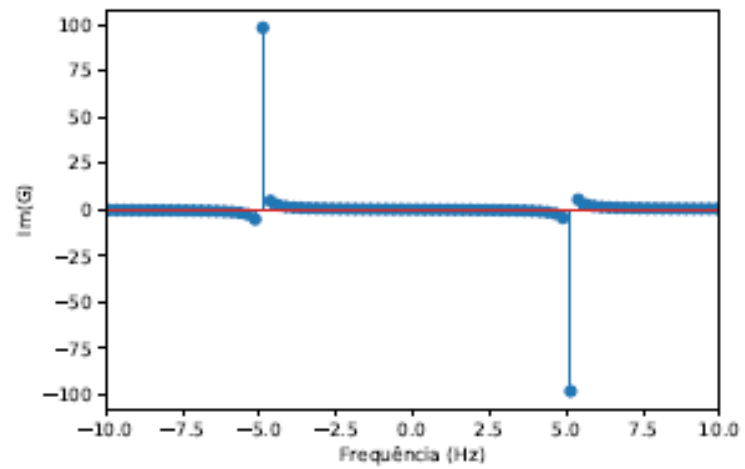
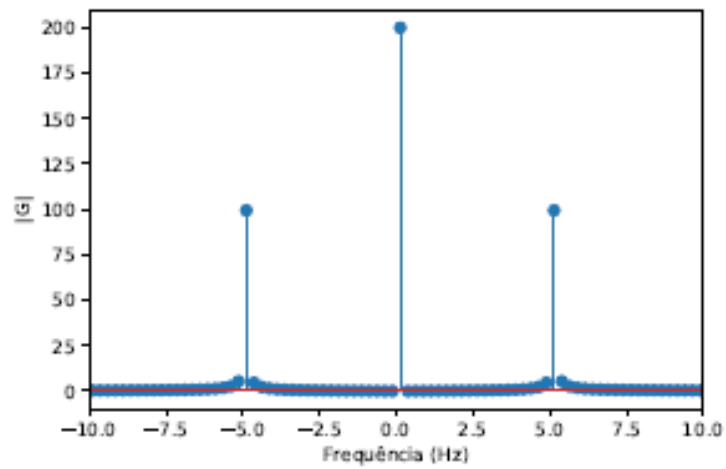
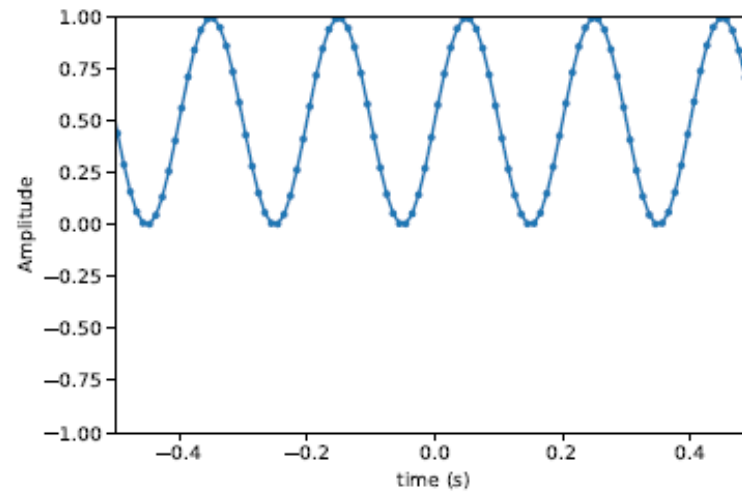
$$x(t) = \text{sen}(5t)$$



Obtemos os seguintes gráficos da transformada :

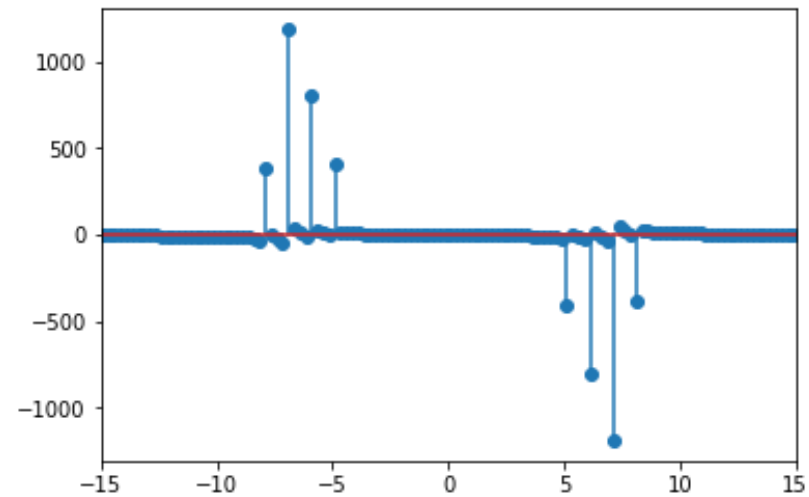
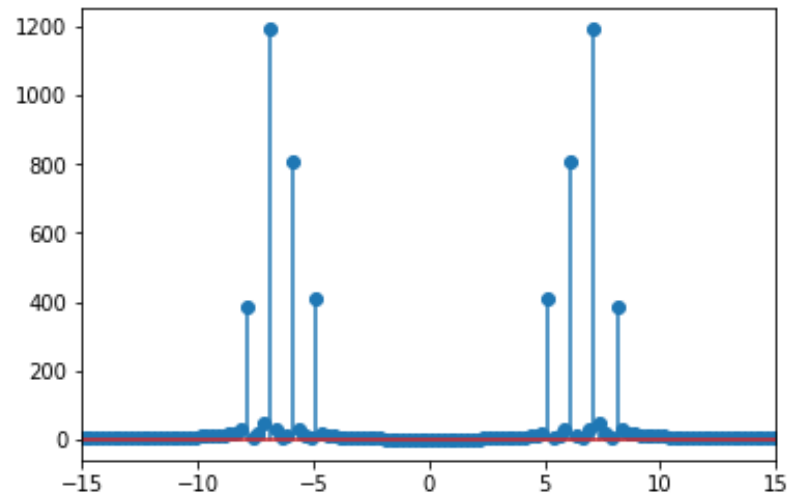
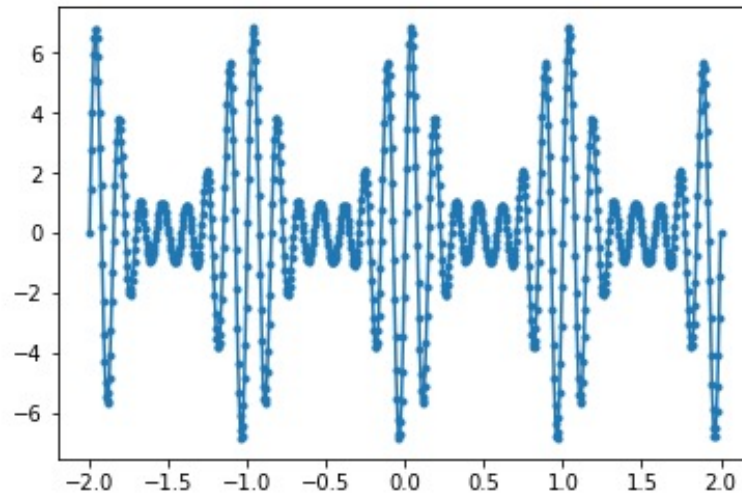


$$x(t) = 0,5 + 0,5 \cdot \sin(5t)$$

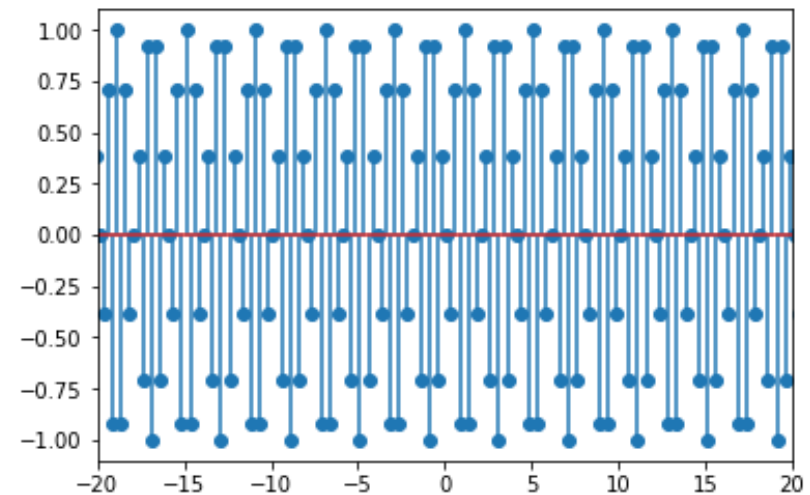
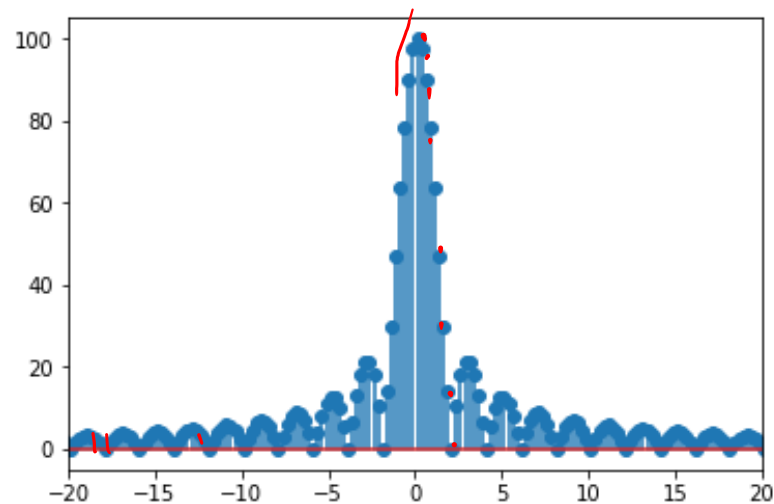
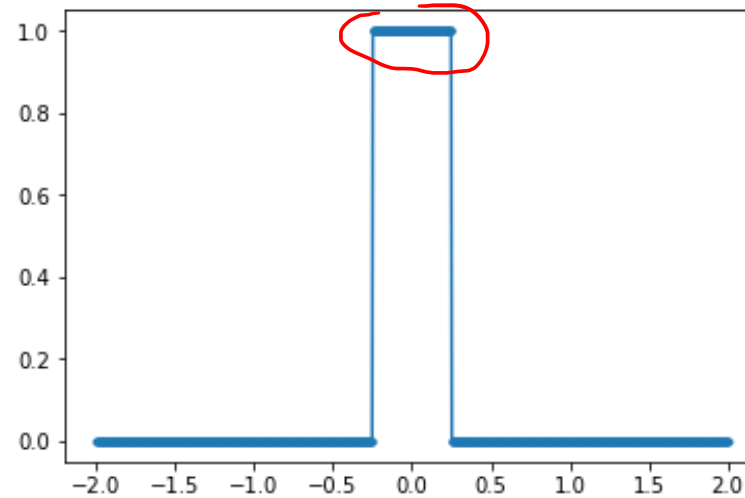




$$x(t) = \sin(5t) + 2.\sin(6t) + 3.\sin(7t) + \sin(8t)$$



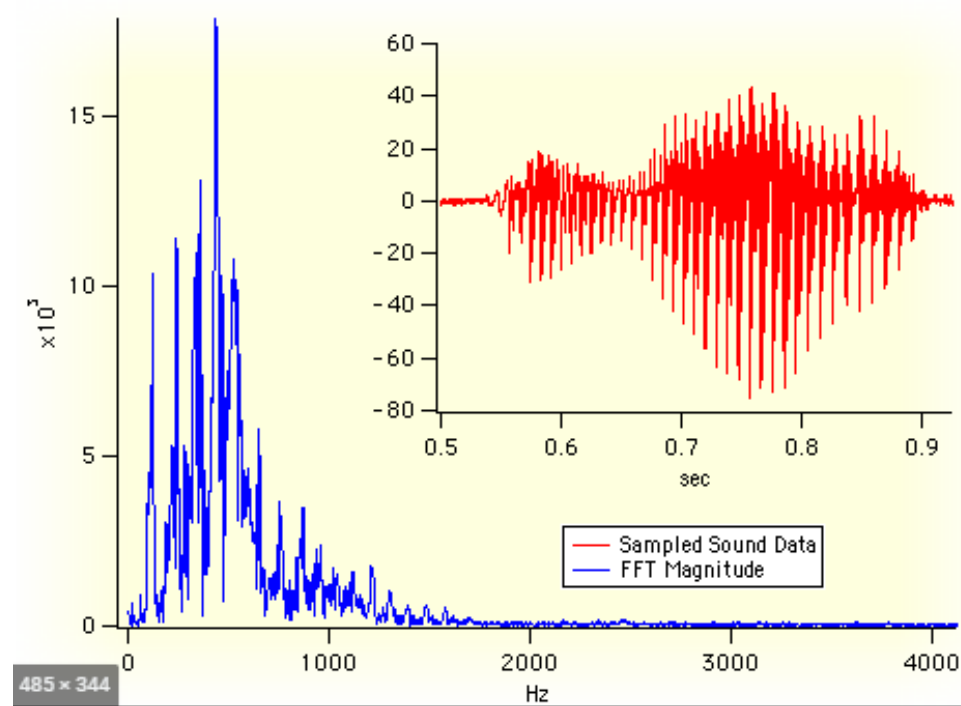
*pulso de largura 0,5 em torno da origem*



# Transformada de Fourier

$$\hat{f}(\omega) = \int_{-\infty}^{+\infty} f(t) \cdot e^{-j\omega t} dt$$

$$\hat{X}[k] = \sum_{n=0}^{N-1} x[n] \cdot e^{-\frac{jkn}{N}}$$



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