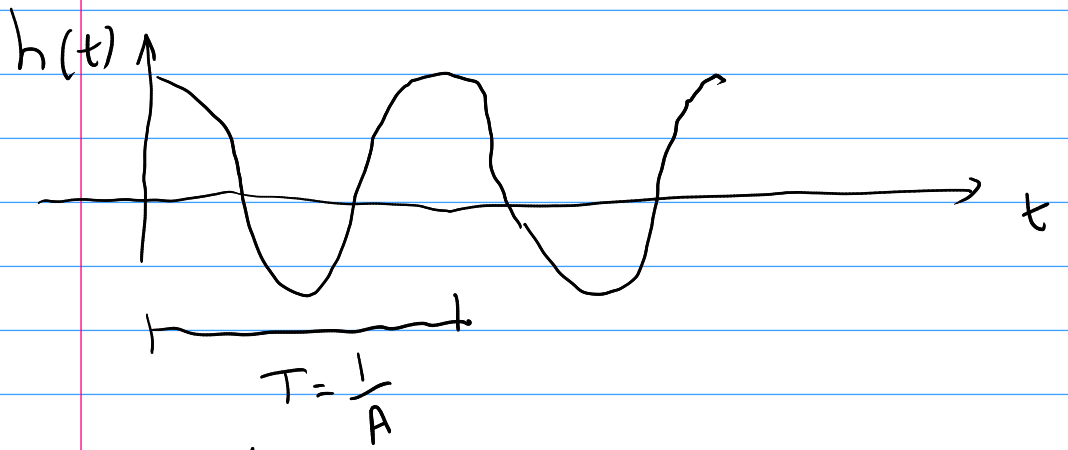
Transforma de Fourier

$$h(t) = \cos(2\pi A t)$$



$$h(t) \rightarrow g(f)$$

T. F

$$g(f) = \int_{-\infty}^{\infty} h(t)\, e^{-i2\pi f t}\, dt$$

Ejemplo:

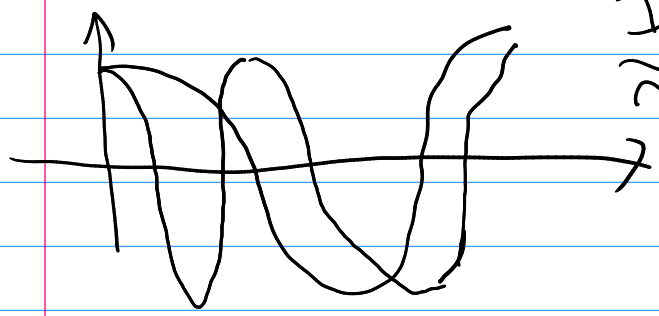
$$h(t) = \cos(2\pi A t) = \frac{e^{i2\pi A t} + e^{-i2\pi A t}}{2}$$

$$g(f) = \frac{1}{2}\int_{-\infty}^{\infty} \left(e^{i2\pi A t} + e^{-i2\pi A t}\right) e^{-i2\pi f t}\, dt$$

$$= \frac{1}{2}\int_{-\infty}^{\infty} \left(e^{i2\pi A t}\, e^{-i2\pi f t}\right) dt + \int_{-\infty}^{-\infty} e^{-i2\pi A t}\, e^{-i2\pi f t}\, dt$$

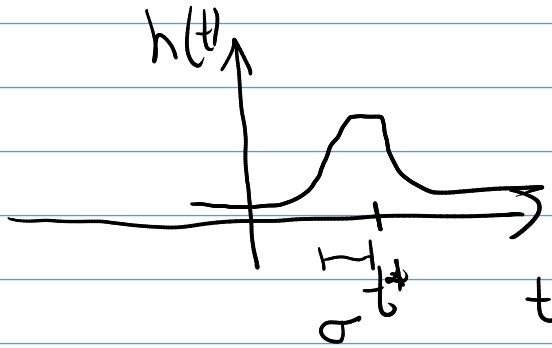
$$e^{i2\pi A t} = \cos(2\pi A t) + i\,\mathrm{sen}(2\pi A t)$$

$$\int_0^{2\pi} \cos(2\pi x)\cos(\pi x) = 0$$



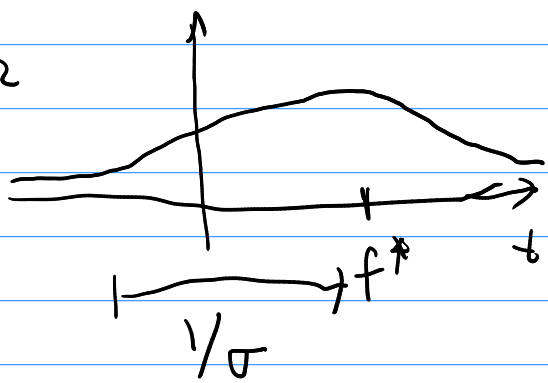
$$g(f) = \frac{1}{2}\left[\delta(f-A) + \delta(f+A)\right]$$

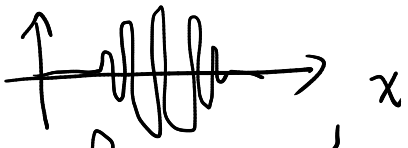
$$h(t) = e^{-\frac{|t-t^*|^2}{2\sigma^2}}$$



$$g(f) = \mathrm{Tr}_f[h(t)] = e^{-\sigma^2|f-f^*|^2}$$

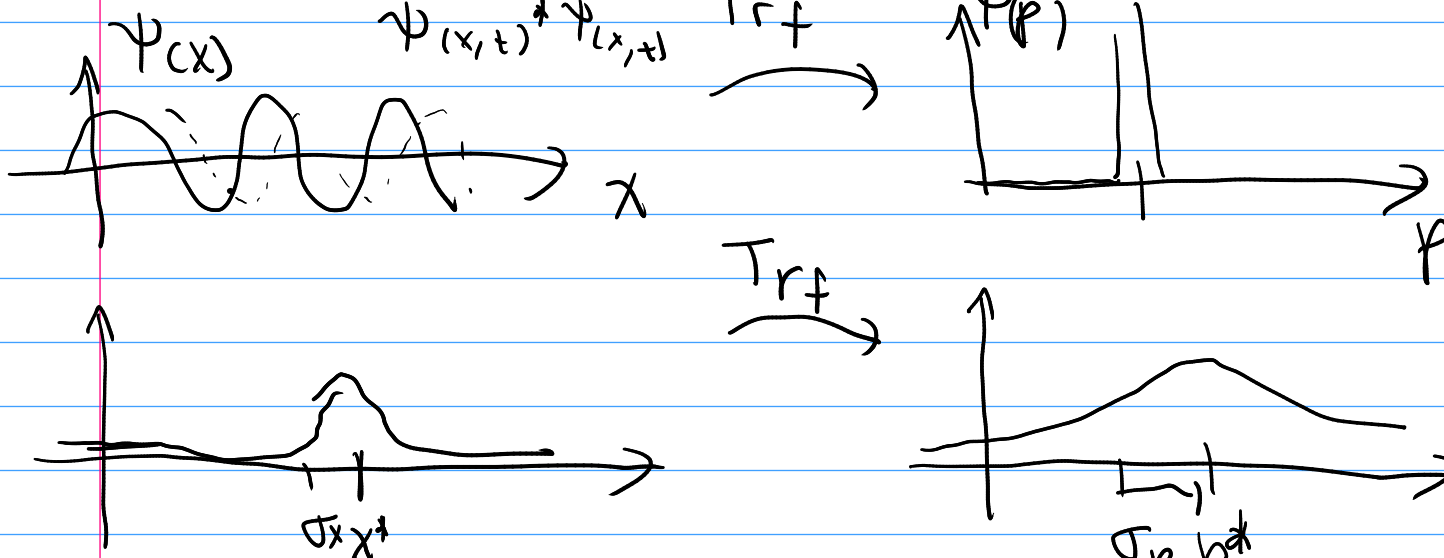
$$= e^{-|f-f^*|^2/1/\sigma^2}$$





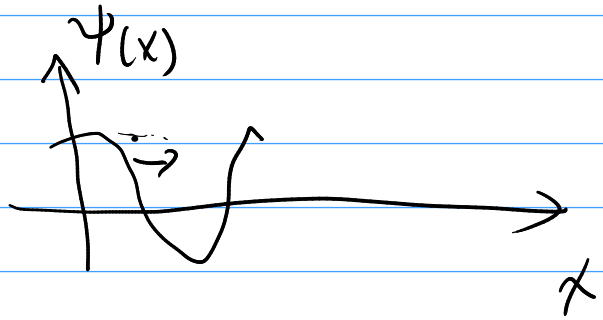
$$\phi(p,t) = \frac{1}{\sqrt{2\pi\hbar}} \int e^{-ipx/\hbar}\, \psi(x,t)\, dt$$

$$\psi(x,t) = \frac{1}{\sqrt{2\pi\hbar}} \int e^{+ipx/\hbar}\, \phi(p,t)\, dt$$



$$\sigma_x \sigma_p \geq \frac{\hbar}{2}$$

$$P(x,t) = \psi(x,t)^* \psi(x,t)$$



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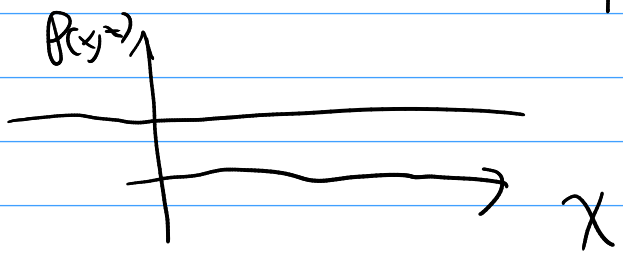
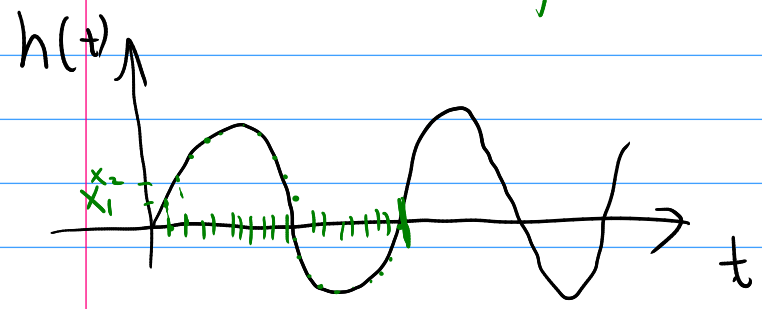


Transforma de Fourier Discreta



N

$$h(t) \rightarrow x_n$$

$$g(f) \rightarrow X_n$$

$$X_K = \sum_{n=0}^{N-1} x_n e^{-i2\pi Kn/N}$$

$$\begin{bmatrix} X_0 \\ \vdots \\ X_{N-1} \end{bmatrix} = \begin{bmatrix} e^{-i2\pi(0)(0)} & e^{-i2\pi(0)(1)} & \cdots \\ e^{-i2\pi(1)(0)} & & \\ \vdots & & \\ & & e^{-i2\pi k,n} \end{bmatrix} \begin{bmatrix} x_0 \\ x_1 \\ \vdots \\ x_{N-1} \end{bmatrix}$$

(k,n)