Université de Genève

Imagerie Numérique
13X004

TP 10: 1D Discrete Fourier Transform

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April 29, 2021

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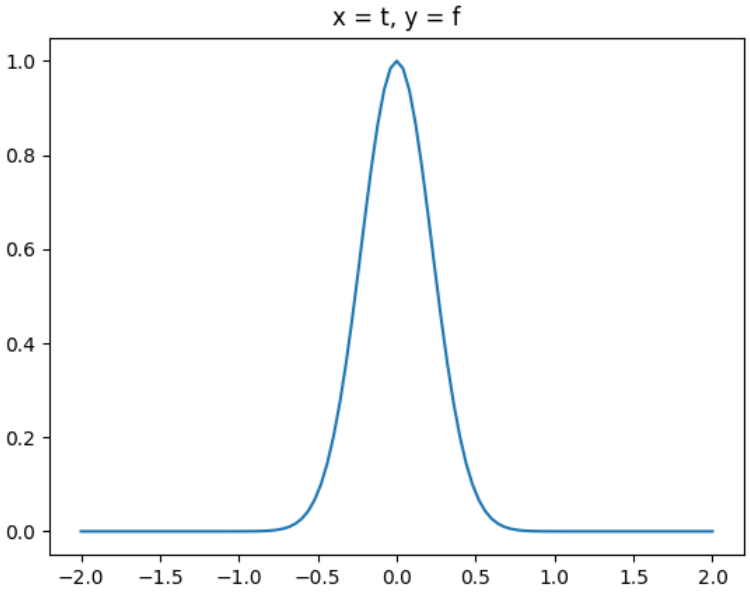
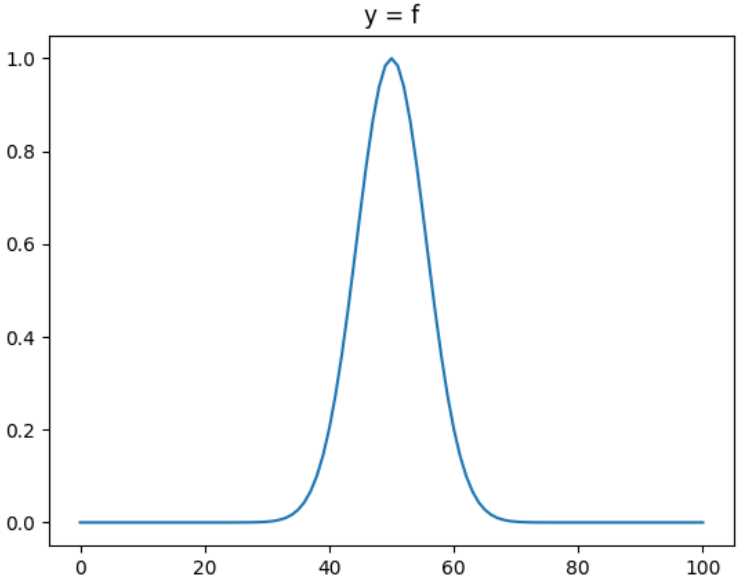
Exercise 1

(a) in .py

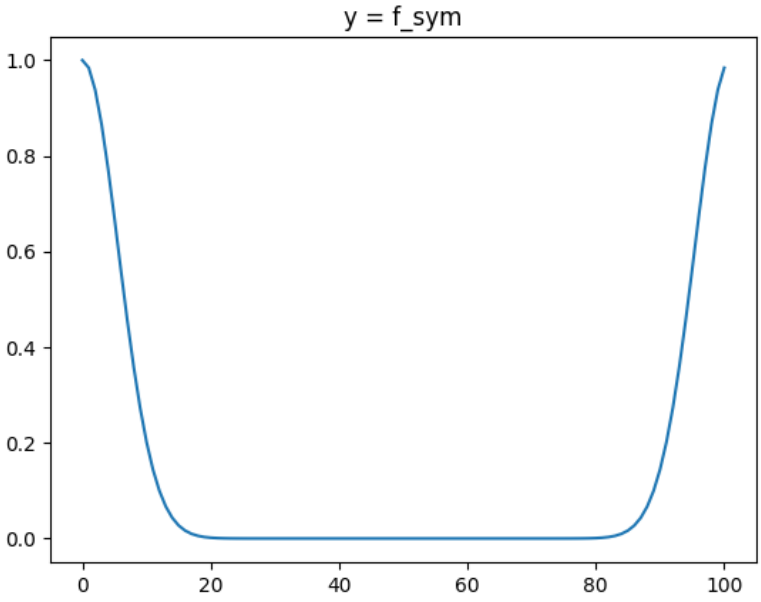
(b) s



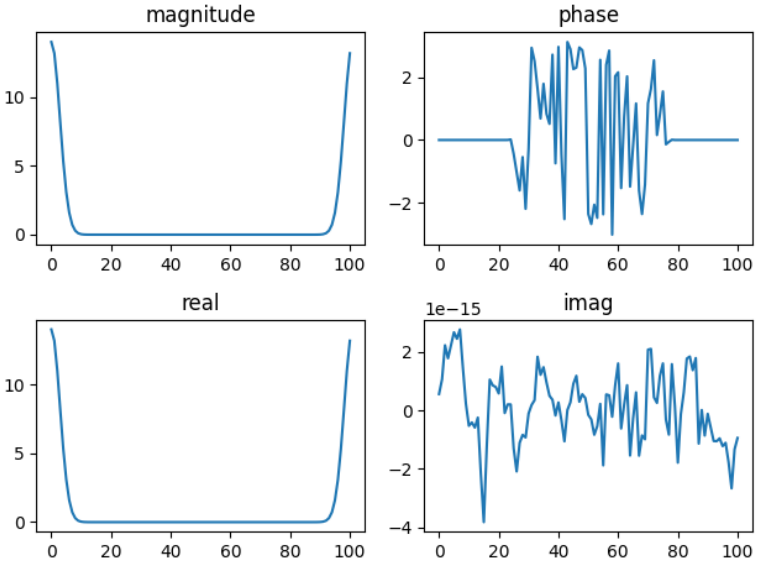
(1) plot with x = [-2:2]



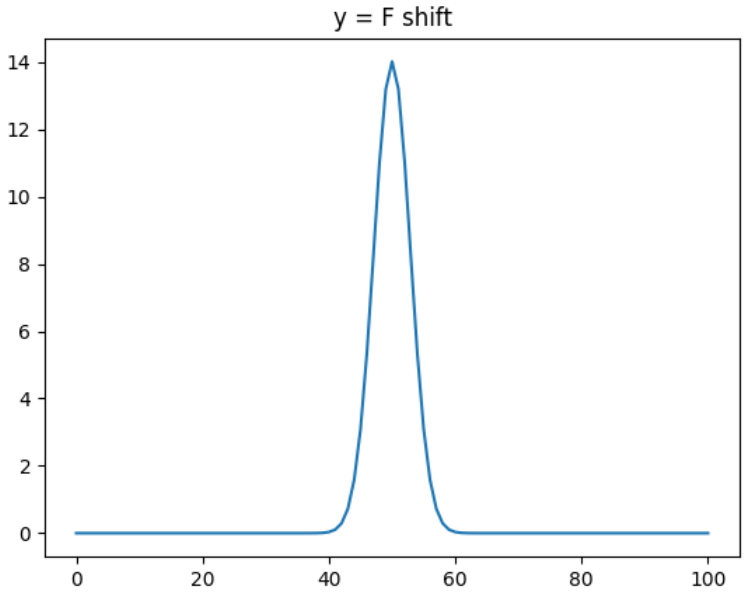
(2) plot with x = default



(3) plot y = fsym

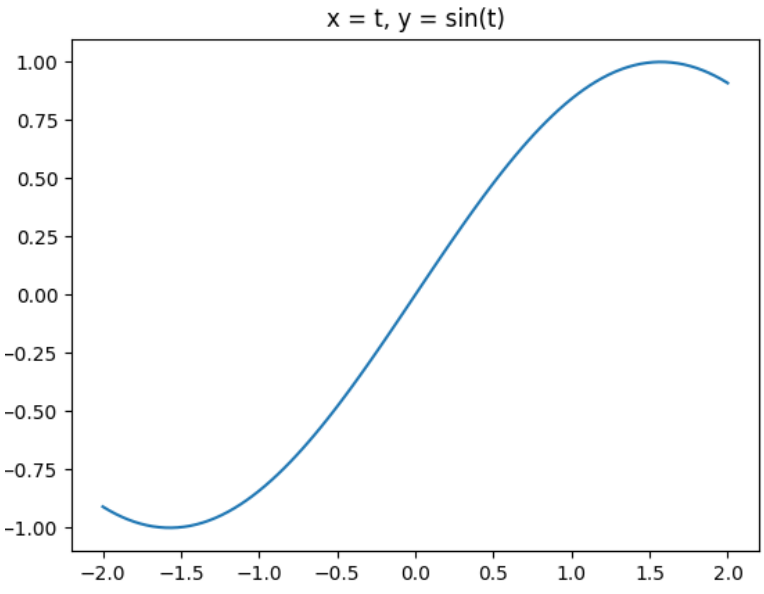


(4) plot y = F = np.fft.fft(fsym)



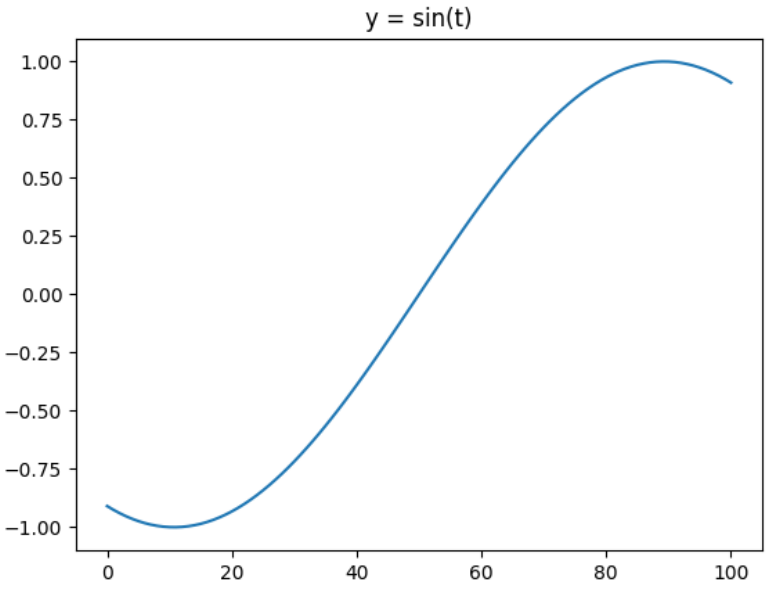
(5) plot y = np.fft.fftshift(F)

(c) s

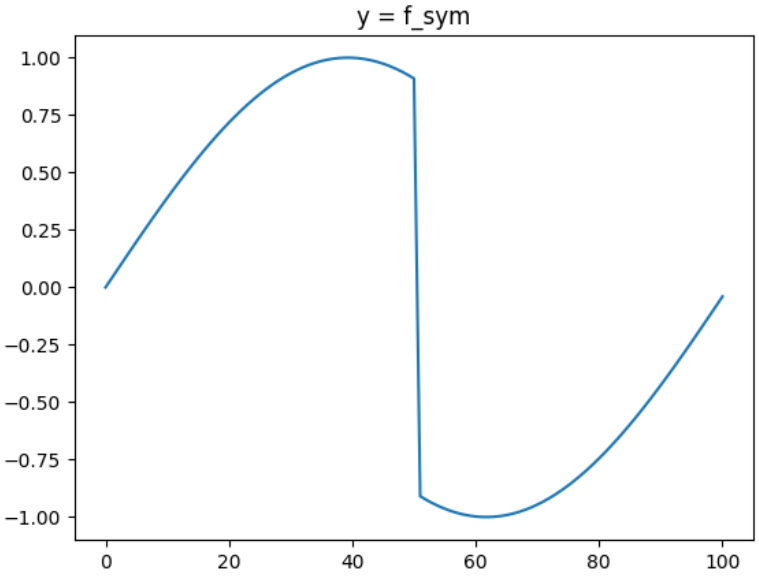


(1) plot with x = [-2:2] and f = sin(x)

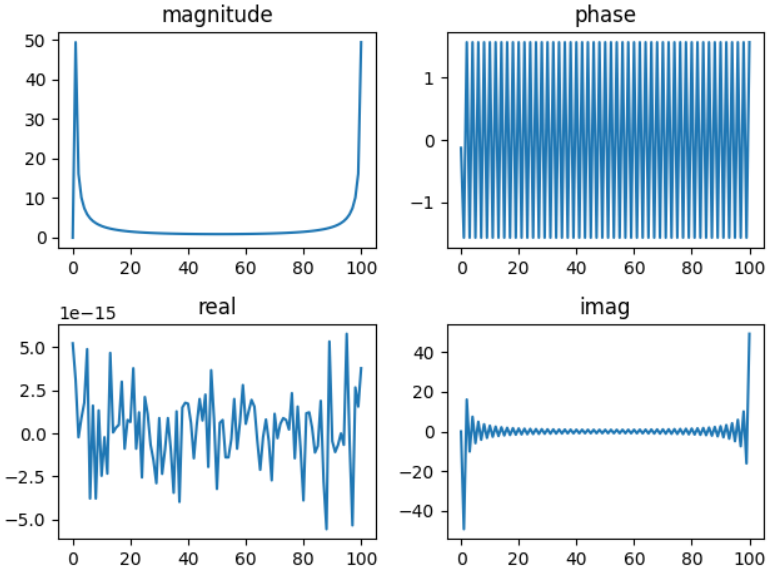
(2) plot with x = default



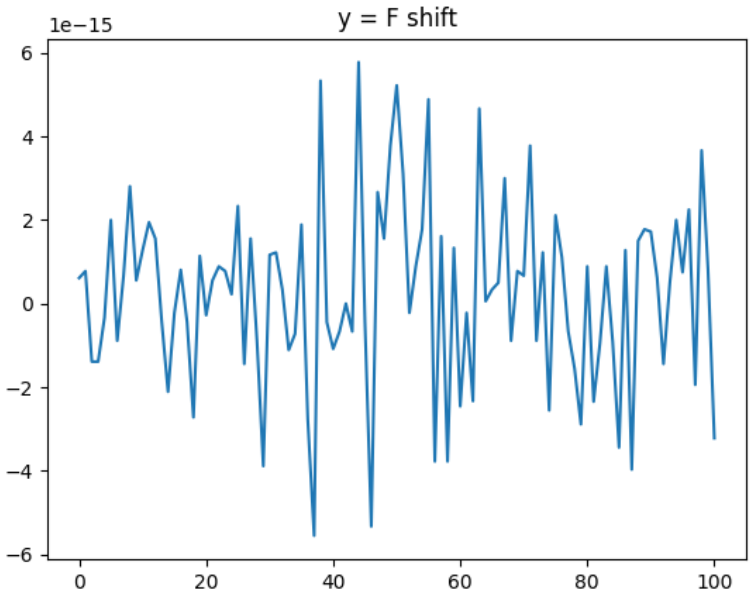
(3) plot y = fsym



(4) plot y = F = np.fft.fft(fsym)



(5) plot y = np.fft.fftshift(F)



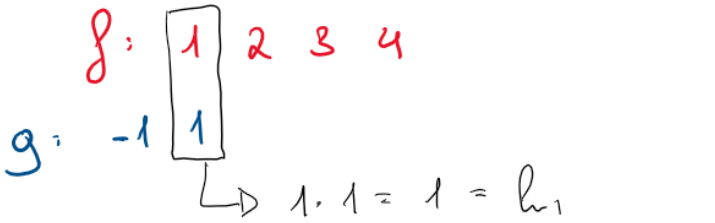
Exercise 2

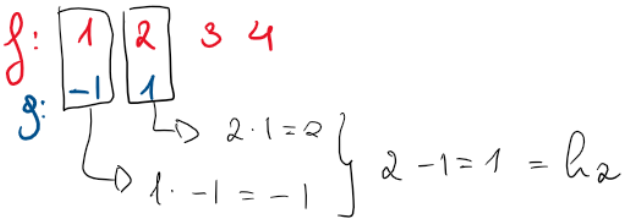
(a) normal convolution :

EXO2 ⓐ $f = [1,2,3,4]$, $g = [1,-1]$

$$h(x) = f(x) * g(x) = \sum_{-\infty}^{\infty} f(m) \cdot g(x-m)$$

$\hat{g}(x) = [-1,1] \rightarrow g(x)$ flipped





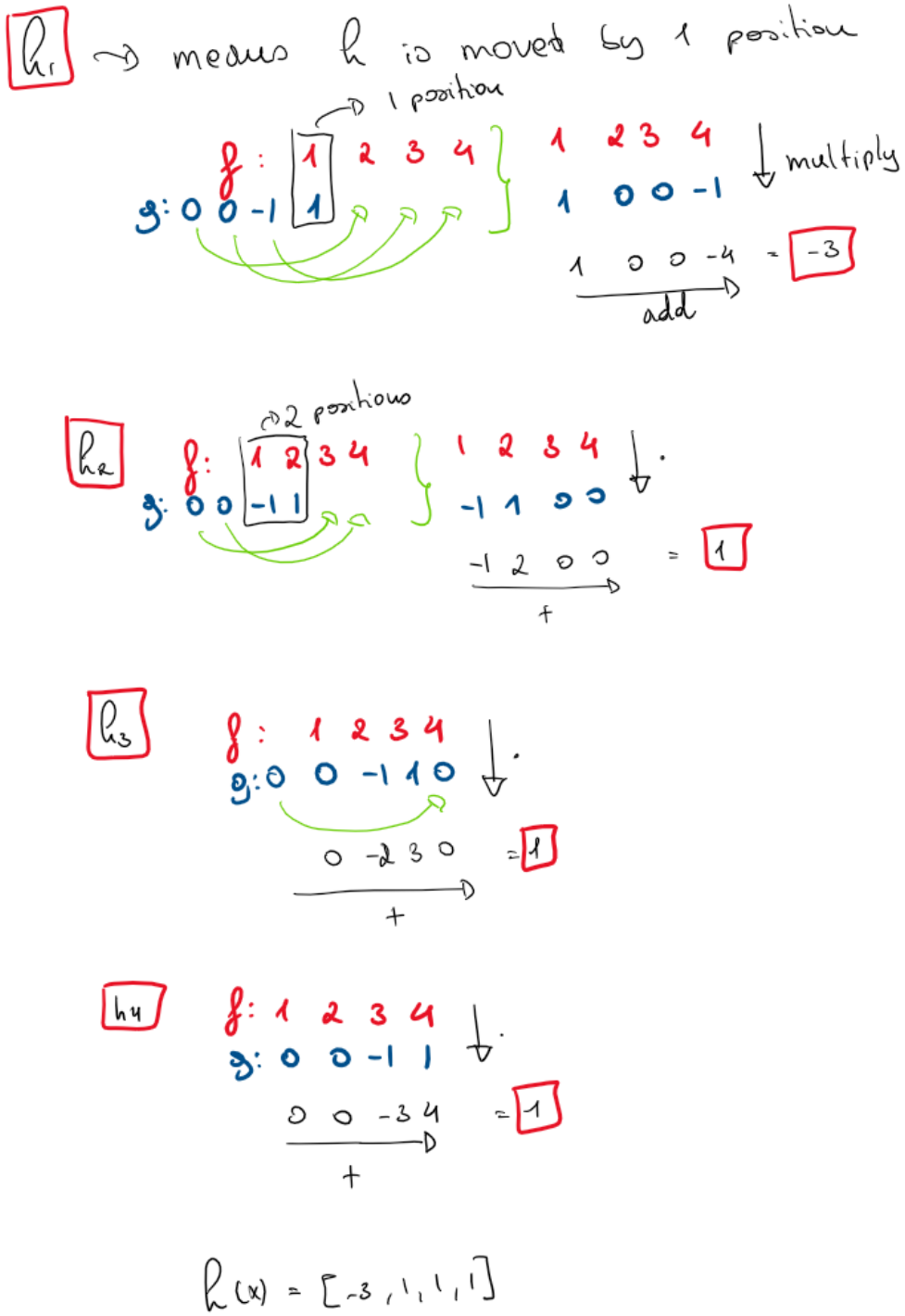
$h_3 = 2 \cdot -1 + 3 \cdot 1 = 1$

$h_4 = 3 \cdot -1 + 4 \cdot 1 = 1$

$h_5 = -1 \cdot 4 = -4$

$h(x) = [1,1,1,1,-4]$

(b) cilcular convolution :



(c) in .py -> results were the same

(d) in .py -> results were the same