CIS580 Problem Set 6

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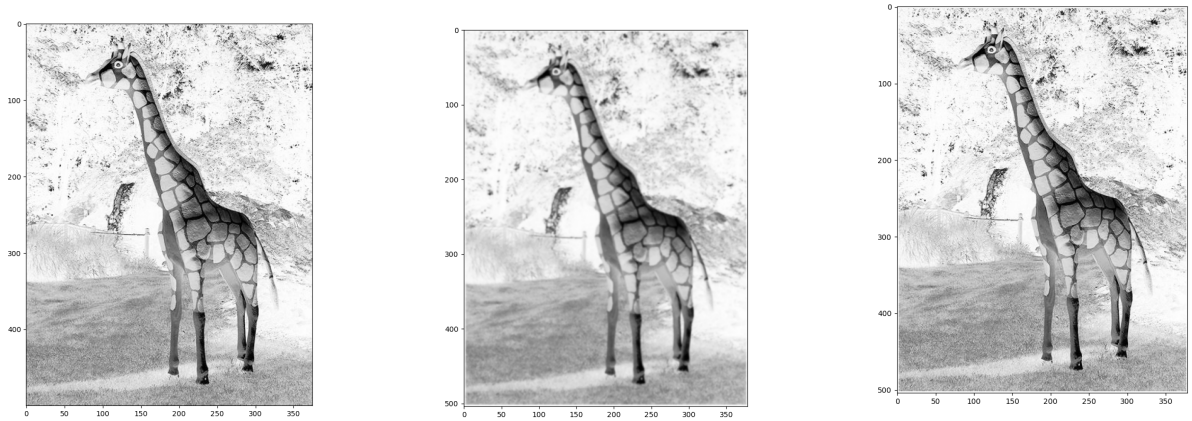
Contents

1 Convolution of image with a Gaussian



(a) Original Image (b) $\sigma = 1$ (c) $\sigma = 0.1$

Figure 1: Three simple graphs

2 Convolution of Gaussians

3 Convolution of Step Edge with Gaussian derivative

4 Box Function

5 1D FFT Quiz

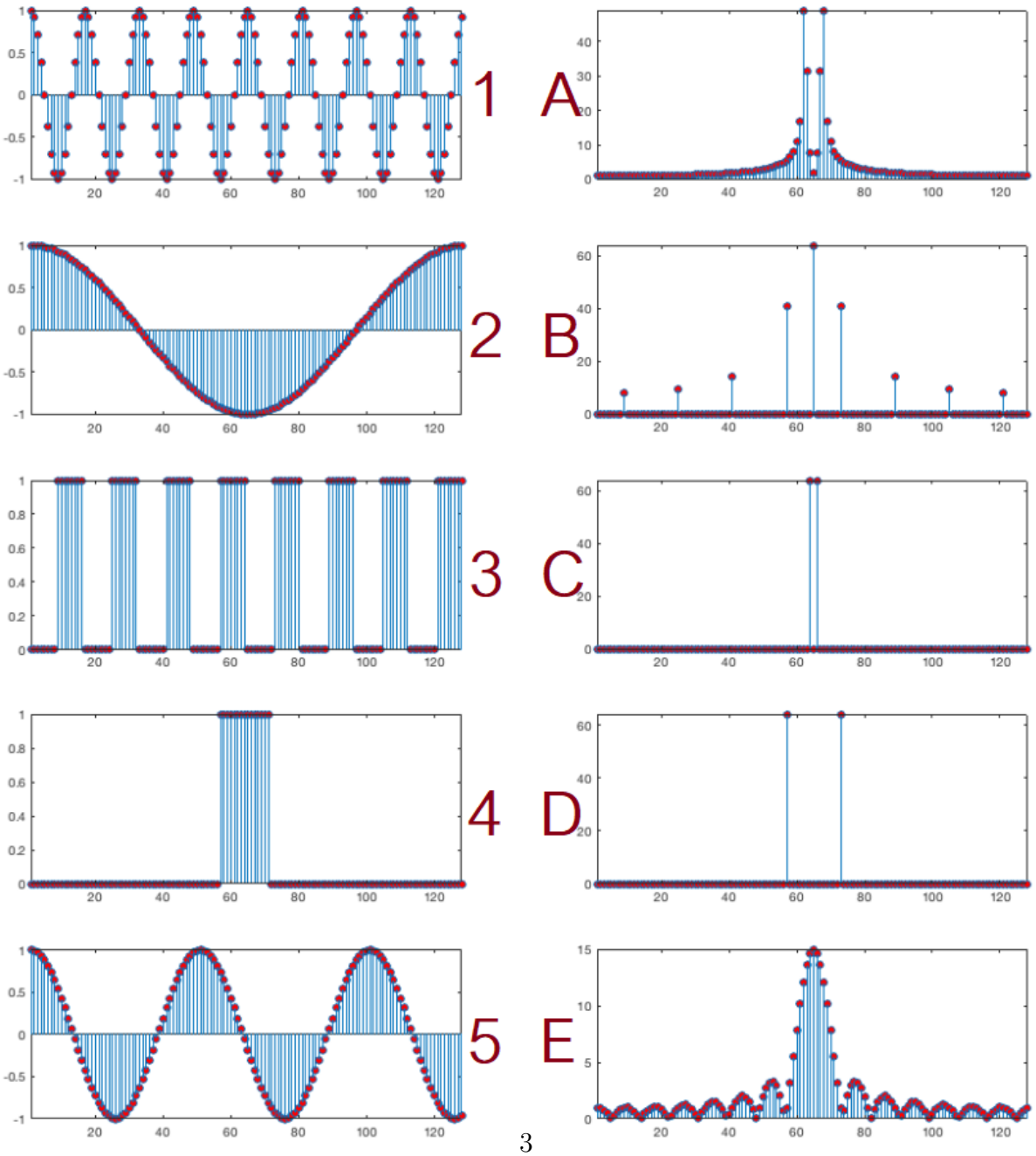


Figure 2: Functions and corresponding FFTs

Function	FFT Plot
1	D
2	C
3	B
4	E
5	A

My reasoning for the above matching is that in frequency domain, the distance between the two peaks is proportional to the frequency of the curves.

6 2D Fourier Transform

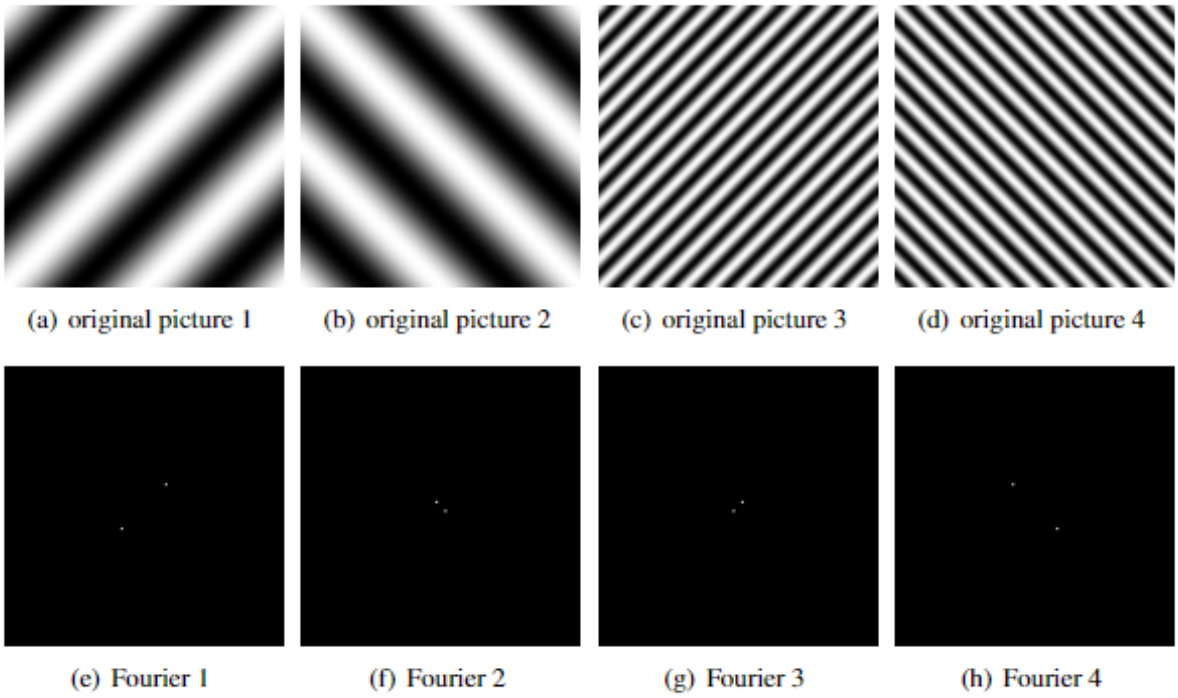


Figure 3: Functions and corresponding FFTs

Function	FFT Plot
A	F
B	G
C	H
D	E

My reasoning for the above matching is that the separation of the white dots in the frequency domain is proportional to the frequency of the black and white signals. This reasoning is similar to the 1-dimensional case where the distance between the two peaks in the frequency domain was proportional to the frequency of the curves.

7 Filter Design