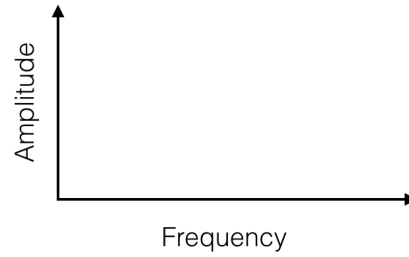
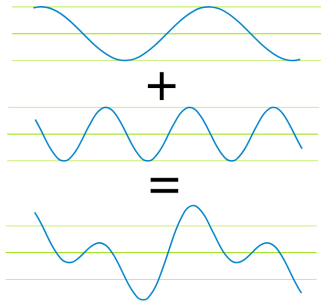


Practice Midterm

- 1) Below left you see a Fourier series of frequencies and below on the right an empty frequency plot. Please, fill in the empty frequency plot with the Fourier series!



- 2) What would be the result if you were to convolve the image below and the kernel below?

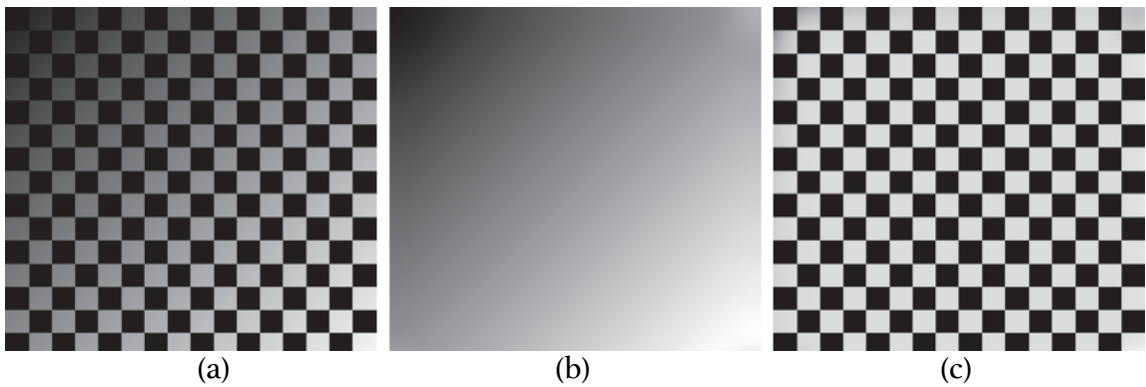


0	0	0
0	0	1
0	0	0

?

Answer:

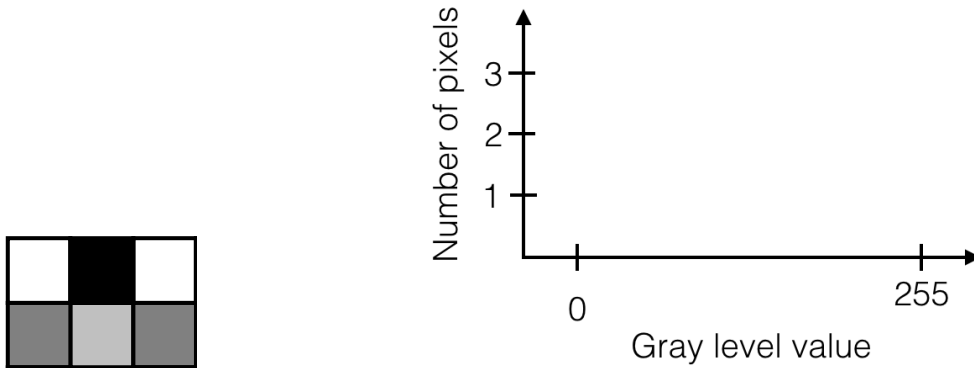
- 3) What operation could you use to produce the image (c) from the images (a) and (b)?



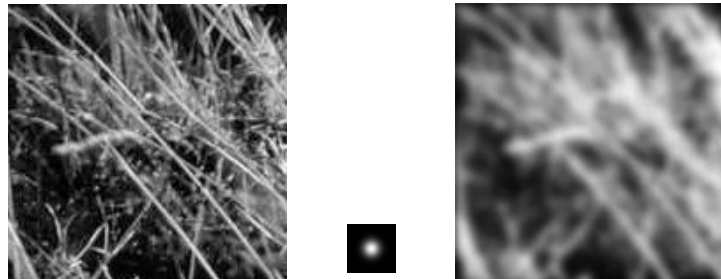
Answer:

- 4) An image histogram lets us visualize what gray level values are present in an image, and how many pixels there are in the image with a specific one of these gray levels. What does the histogram of the synthetic image of squares (below on the left) look like? Please, draw out the histogram in the empty histogram plot!

(Hint: As you can see, there are four gray levels present in this image. You can assume that this is an 8 bit image, meaning gray values go from 0 black to 255 white)



- 5) When we take a photograph with a camera (or image with a microscope) the image is effectively a convolution of every point in the object with the optical transfer function of the camera. This transfer function is airy function, which is the Fourier transform of the circular aperture of the camera. The effect is blurring the finest details in the object. Below you see an example of an image convolution that works in the same way. The image on the left is convolved with the Gaussian kernel in the middle which produces the image on the right.



Now, what would happen if we convolved the image with the same Gaussian again?

- Nothing
- The image would become even more blurred