UNIVERSIDAD PANAMERICANA Campus Bonaterra	Facultad de Ingeniería	Examen: Segundo Parcial
	Academia de Cómputo	Fecha: 17/10/2022
	Materia: Agentes Inteligentes	
	Profesor: JIMENA JUÁREZ	
	Carrera: IIA	
	Miembros de Equipo:	

I.	Valor: 35%	

(a) When performing linear filtering, explain the difference between correlation and convolution. When are the two operations equivalent?

(b) What is the purpose of normalizing a filter kernel to sum to 1? Is this always necessary?

(c) Explain two of the possible solutions for dealing with image-boundaries when filtering.

(d) Design one example of a 3x3 smoothing filter that emphasizes vertical neighbors, and emphasizes the middle pixel even more.

(e) Give three reasons that a 2D Gaussian makes for a good smoothing kernel.

(g) If F[G] looks like the following 2D image, what effect would this filter have on f?

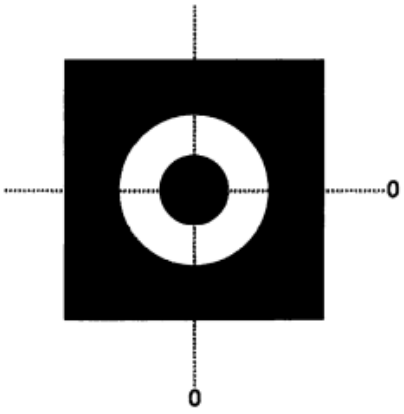

Figure F[G]. DFT of filter g, centered on frequency coefficients (0, 0).

(f) (i) You are given only the Discrete Fourier Transforms (DFTs) of an image f and a filter-kernel g: F[f] and F[g], respectively. Explain how you would generate the filtered image version of f.

II.	Valor: 20%	

a. How does one make a Gaussian image pyramid that gets narrower toward the top?

b. Describe in words the effect of convolving an image by the kernel $k = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$.

III.	Valor: 45%	

In the subimages below, (a) and (b) denote two input images, while (c) and (d) are the magnitude of their Fourier transforms (not necessarily in that order). How are the images related, i.e., does $a \rightarrow c$ or $a \rightarrow d$? Please explain your reasoning.

IV.	Valor: 10%	

What is meant by Nyquist sampling rate?