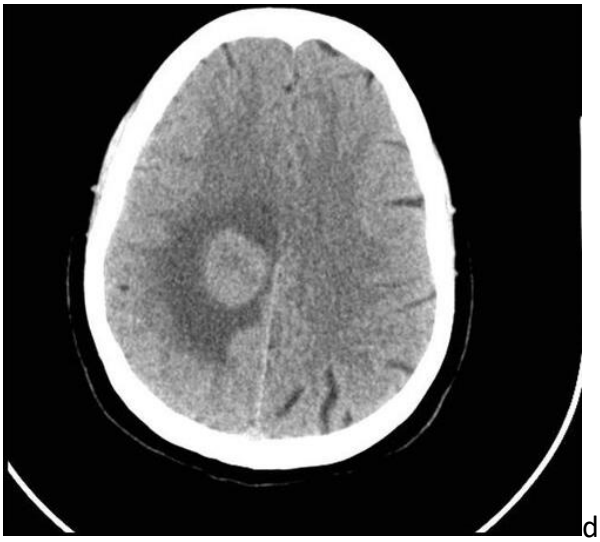
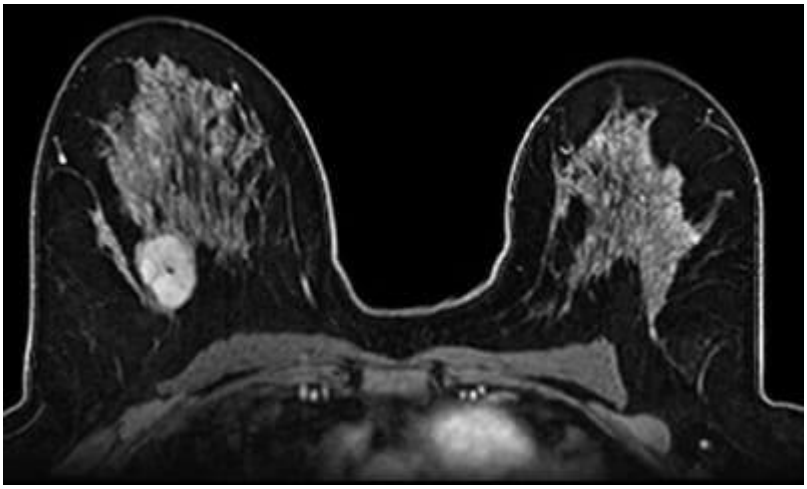
Q1 (5 pts): Please answer whether the following imaging modalities are ionizing radiation?

	Ultrasound	CT	MRI	PET
Ionizing Radiation (yes or no)				

Q2 (10 pts): please label the following image modalities: Ultrasound, x-ray/CT, MRI, PET



d



Q3 (10 pts): Circle the signals in the histogram to segment and keep the object while eliminating the high intensity background.

Original Image

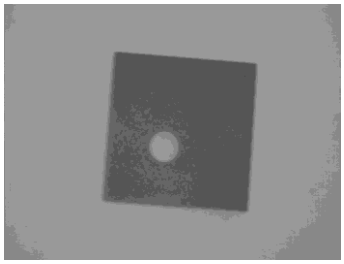
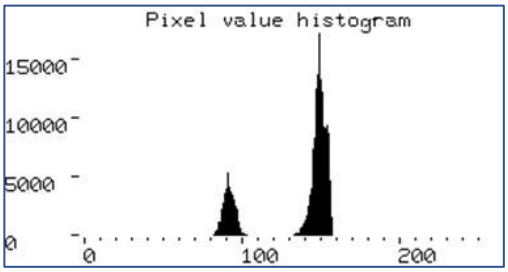
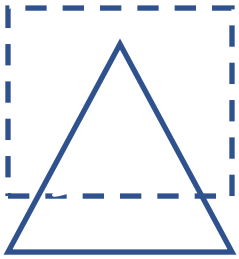


Image Histogram

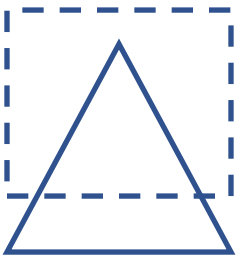


Q4 (10 pts): Please shade the areas that represents the logical Boolean operations between the following two shapes.

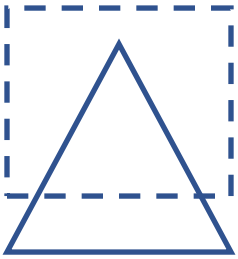
OR



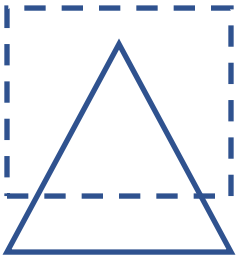
Subtraction (□-Δ)



AND



XOR



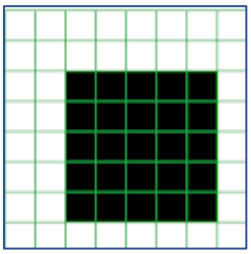
Q5 (10 pts): Connect the corresponding areas between the Fourier space and the image space using lines.

Image Space:	**Fourier Space:**
Contrast (brightness)	Center Area (low frequency)
Detail (edge)	Peripheral Area (high frequency)

Q6 (10 pts): In the Hough transformed space of the following image, how many intersection points would you expect?

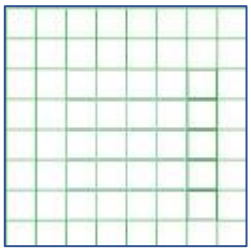
Answer:

Q7 (10 pts): Mark the region after applying image dilation and erosion. Please note that "1" is represented by black pixels, and "0" is represented by white pixels.

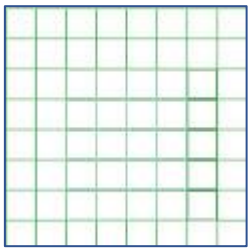


Original Image

Structure Element



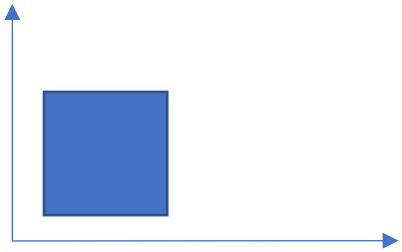
Dilation



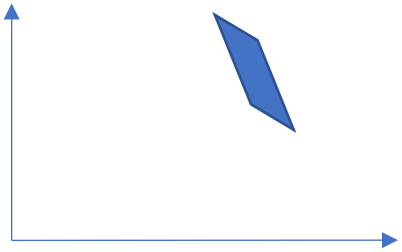
Erosion

Q8 (10 pts): In 2D cases, what kind of transformation it is as shown below and how many degrees of freedom are involved?

Before



After



Q9 (10 pts): Connect the relationship between components and the methods.

Relationship:	Orthogonal	Uncorrelated	Independent
Methods:	PCA	ICA	

Q10 (15 points): Connect methods to applications (single or multiple selections)

Otsu method	Dimension Reduction
PCA	Classification
ICA	Thresholding
LDA	Segmentation
SVM	Feature Extraction
Hough Transform	CT Reconstruction
Fourier Transform	MRI Reconstruction
Radon Transform	Image Compression
Watershed	Noise reduction
Wavelet Transform	Line Detection