ECE 278C **IMAGING SYSTEMS** **Winter 2021**

ASSIGNMENT 2: Backward Propagation Technique

Due: Tuesday, February 2

Name: ______________________________

Objective: The main objective of this programming assignment is to experience image formation by backward propagation for a simplified 2D case instead of the full-scale 3D *plan-to-plane model*.

There are 6 active point sources, located at (x_n, y_n), $n = 1, 2,.. 6$.

	scatters	*scatter locations*
1	(x_1, y_1)	$(0, +10\lambda)$
2	(x_2, y_2)	$(+10\lambda, 0)$
3	(x_3, y_3)	$(0, -10\lambda)$
4	(x_4, y_4)	$(-10\lambda, 0)$
5	(x_5, y_5)	$(-8\lambda, -6\lambda)$
6	(x_6, y_6)	$(+8\lambda, -6\lambda)$

The *receiver aperture* is organized in the form of a centered linear receiver array with a span of 60λ (from $x = -30\lambda$ to $x = +30\lambda$). This linear receiver array is located at

$$y = y_o = -60\lambda.$$

With quarter-wavelength spacing ($\lambda/4$) spacing, there are 241 wavefield data samples in total over the 60λ-long linear aperture.

(A) Perform image reconstruction of the 60λ x 60λ 2D source region. The source region is a square area centered at $(0, 0)$ and bounded by $x = \pm 30\lambda$ and $y = \pm 30\lambda$. For consistency, use quarter-wavelength spacing as the sample spacing in both directions.

(B) Plot the magnitude distribution of your reconstructed images.

Report format:

1. Cover page.
2. Figures
3. Summary: (comments based on your observations)
4. Appendix: (computer code)