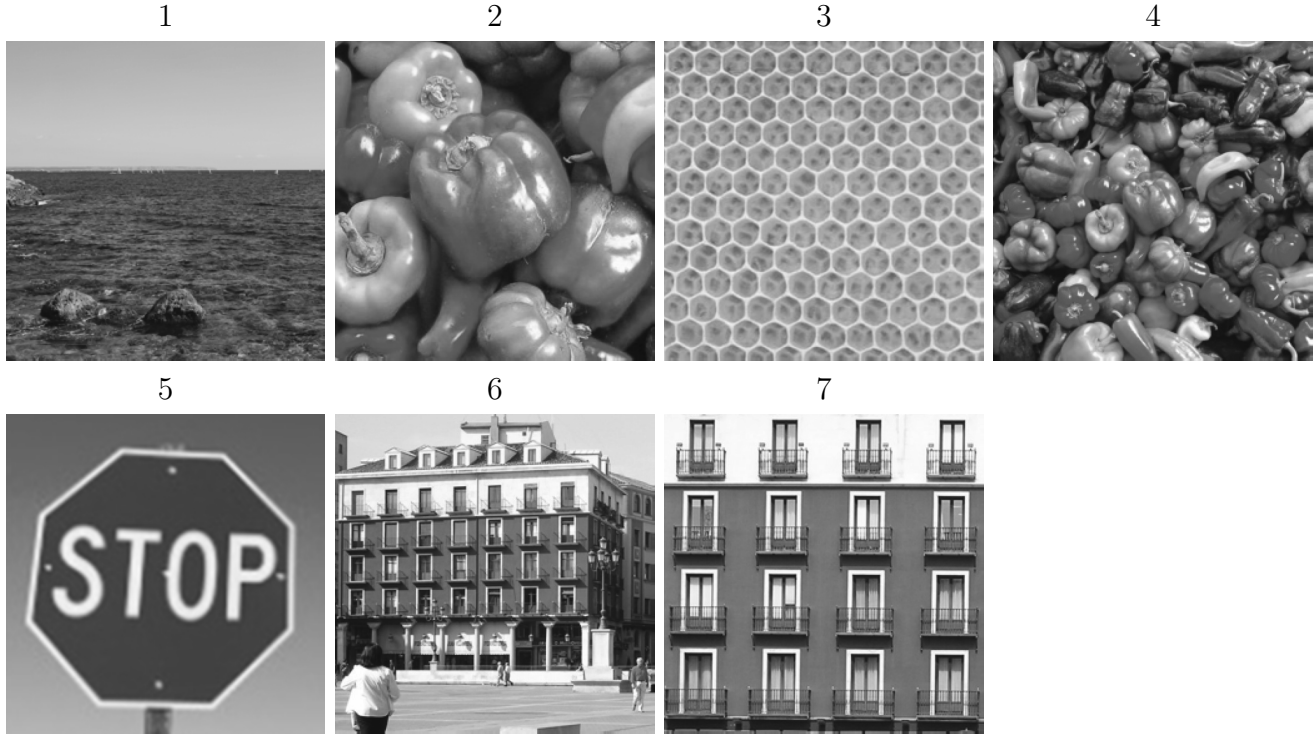


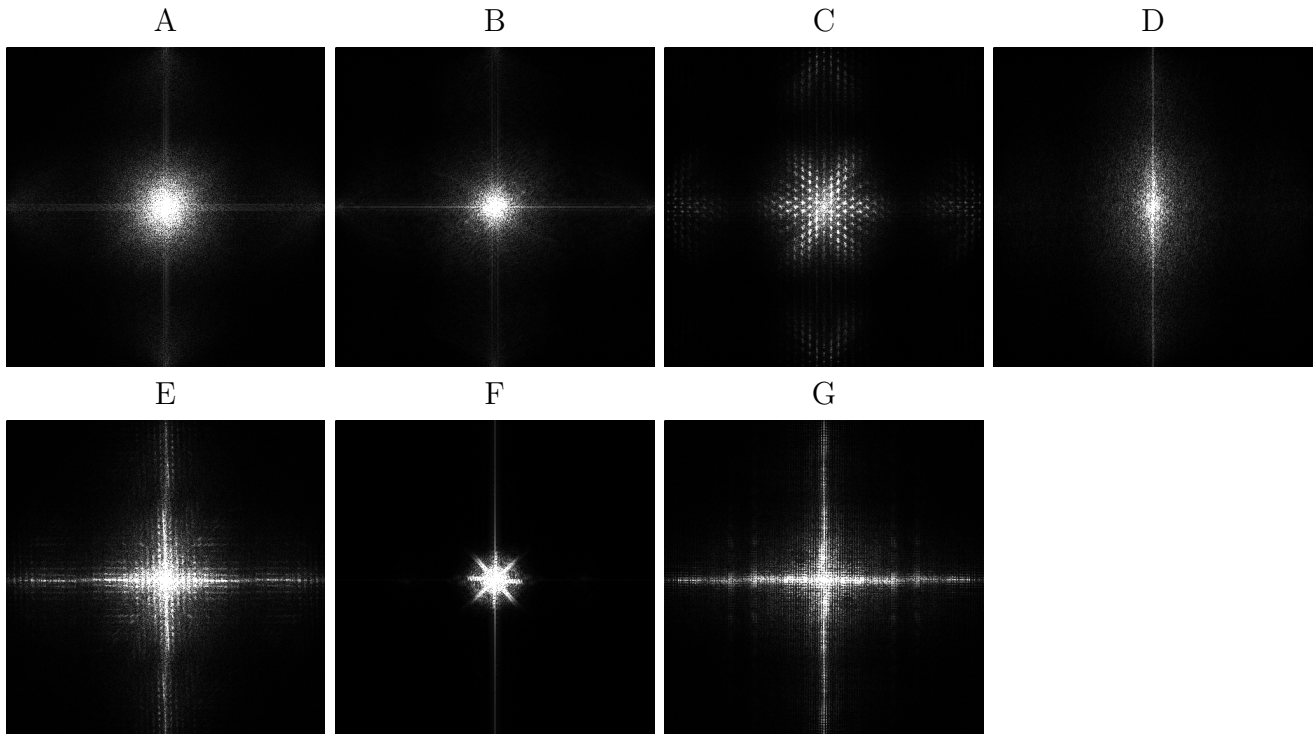
Fourier Picture Matching

- Fourier Picture Matching

In each of the following images, white represents a value of 1, black represents a value of 0, and grays lie between those extremes. The origin ($n_x = n_y = 0$) is in the lower left corner of each image.



Each of the following 7 panels shows the magnitudes of the DFT coefficients associated with one of the above images. Notice that the origin ($k_x = k_y = 0$) is in the center of each of these panels. as *A* through *I*):



Which transform (A-G) matches each image (1-7). Briefly explain your reasoning.

1. The horizontal features of this image contribute a single strong vertical feature through the origin of the transform, which is therefore D.
2. This image and image 4 have features at virtually all angular orientations. Most of those features are at relatively low frequencies, as in transforms A and B. Since the features in image 2 are at lower frequencies than those in image 4, the transform of image 2 is B.
3. The six-fold symmetry of the honeycomb will generate six-fold symmetry of the transform. Therefore the answer is C.
4. See the description for image 2 above. Since the features in image 4 are at higher frequencies than those in image 2, the transform of image 4 is A.
5. The eight-fold symmetry of the stop sign will generate eight-fold symmetry of the transform. Therefore the answer is F.
6. Images 6 and 7 have prominent horizontal and vertical features. Since image 7 is a zoomed version of image 6, the transform of image 6 should be a zoomed version of the transform of image 7. Therefore the transform of image 6 is E and that of image 7 is G.
7. The answer is G (see above).