**HW#6 Fall 2018**

**Morphology**

1. Consider the image in Fig. 9.3. Erode it with the following structural elements. In each case, the red pixel is the center.

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|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
|  | 1 | 1 | 1 |  |  |  |  |  |  |  | 1 | 1 | 1 |  |
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1. Prob. 9.6 a, b, c

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1. Obtain the opening of the figure below with a 3x3 structuring element of 1’s. Repeat for the closing operation.

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|  | 1 | 1 | 1 |  |  |  |  |  |  |  | 1 | 1 | 1 |  |
|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
|  | 1 | 1 | 1 |  |  |  |  |  |  |  | 1 | 1 | 1 |  |
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1. 9.17: Use MATLAB with the structural element defined as se = strel(‘dis’, 11, 0))

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1. Given an image with circles and squares of various sizes, provide an algorithm that uses morphological and logical operations to answer the following questions. Write an explanation and a pseudo-code:



(a) What fraction of the image pixels is white?

(b) How many objects are in the image?

(c) How many holes are in the image?

(d) How many objects have one or more holes?

(e) How many square objects are in the image? Hint: Count row&column pixels

(f) Identify the square objects that have holes.

(g) Identify the circular objects that have no holes.