Exercise 5 – Morphological operators (4.December.2017 16:00-17:00)

1. A binary image is represented below:

1	1	0	1
0	1	1	1
1	1	1	0
0	1	1	1
1	1	1	0
1	1	0	0
1	1	1	0

1. Use the structural element 4-closest neighbours (includes center pixel) to perform:
   a. Erosion

   b. Dilation

2. Use the structural element 8-closest neighbours (includes center pixel) to perform:
   a. Erosion

   b. Dilation

2. Consider the following binary image:

0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	1	1	1	1	1	0	0	0
0	0	1	1	1	1	1	0	0	0
0	0	1	1	0	1	1	0	0	0
0	0	1	1	1	1	1	0	0	0
0	0	1	1	1	1	1	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	0

Structural element:

1	1	1
1	1	1
1	1	1

a) Perform a dilation.
b) Perform an erosion.
c) Perform an erosion after a dilation.
d) Perform a dilation after a erosion.
e) How many connected components do you have in each image?

3. Which image corresponds to one of the previous operations (a,b,c,d):

a. Original
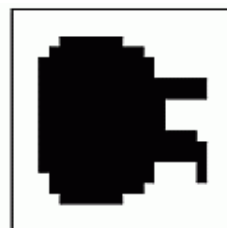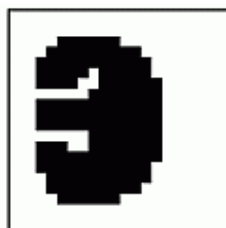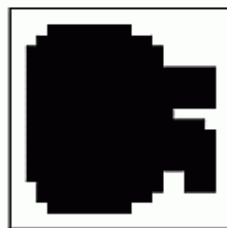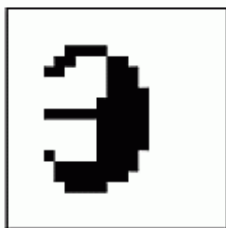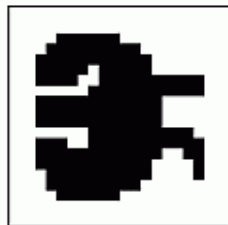
4. Take an example binary image in matlab (e.g. take the grayppeppers image and binarize it) and try these operations.

5. The operation performed was an erosion (first three rows) or a dilation (last three rows). Draw the images in the correct parts of the table.

Square:

0	0	0
0	1	1
0	1	1

Vertical:

0	0	0
0	1	0
0	1	0

Horizontal:
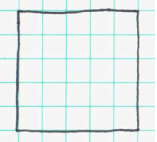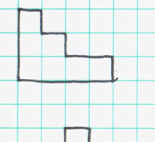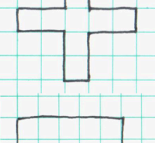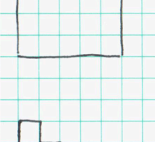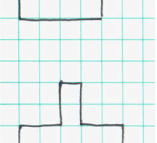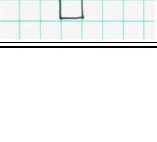
0	0	0
0	1	1
0	0	0

Diagonal

0	0	1
0	1	0
0	0	0

Cross:

0	1	0
1	1	1
0	1	0

		Square	Vertical	Horizontal	Diagonal	Cross
Erosion						
Dilation						