CSC317 Visual Programming
Homework Assignment #3

1. Morphology – Exercise Problem #1 in our textbook

   Find A1 ⊖B1; A1 ⊕ B1; A1 ◎ B1; and A1 ◉ B1 manually. Check the answers with OpenCV programming.

   A1=

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

   B1=

0	1	0
1	1	1
0	1	0

2. One application of morphology is Noise Removal. In our textbook, there is an image circles.png. You can add some noise to the image and then use morphology to remove the noise. Show the original image and the resulting image.

   Hint: Add noise

```
import skimage.io as io
import numpy as np
c=io.imread('../../OriginalImages/circles.png').astype('bool')*1
x=np.random.random_sample(c.shape)
c[np.nonzero(x>0.95)]= 0
c[np.nonzero(x<=0.05)] = 1
# Generate a kernel and perform morphology – you need to decide what operation to use below
```

3. Edge Detection – Apply Sobel X-Filter and Y-Filter to an image of your choice and demonstrate the effectiveness.