EECS 203A: HOMEWORK #3 Solution
Spring 2022

1.a $g(1,1) = 2,\ g(1,2) = 7,\ g(2,1) = 17,\ g(2,2) = 1$

1.b $h(1,1) = 8,\ h(1,2) = 6,\ h(2,1) = 6,\ h(2,2) = 4$

2.a Image will be 100 in the upper left square of size 51×51 and 200 otherwise using the book coordinate system.

2.b No. The lower right corner of the 100 region will become a 200 after filtering.

3.a No. The number of boundary pixels between the black and white regions is much larger for the chess board image. Thus, there will be many more large absolute output values in the Laplacian-filtered chess board image. There are also different output values that are possible in the filtered chess board image.

3.b This should be done using a computer. The filtered Image1 can have values -600, 0, 600 and the filtered Image2 can have values -800, -600, 0, 600, 800.

4.a) Yes. A convolution of a convolution is another convolution which is a linear operation.

4.b) Convolve the filters with each other to get

$\frac{1}{9}\times$

1	2	3	2	1
2	-5	-3	-5	2
3	-3	0	-3	3
2	-5	-3	-5	2
1	2	3	2	1

4.c) No. Both filters are linear operators.