Exercise 1:

1. a	2. a	3. c	4. c	5. c
6. b	7. a	8. d	9. a	10. d
11. d	12. d	13. d	14. c	15. a

Exercise 2

1. F	2. T	3. F	4. T	5. T
6. T	7. F	8. F	9. F	10. F

Exercise 3:

Exercise 4

A. h_5 / B. h_4 / C. h_2 / D. h_6 / E. h_1 / F. h_3

Exercise 5

Exercise 6

Level	count	pdf	cdf	output
0	3244	0.198	0.198	1
1	3899	0.238	0.436	3
2	4559	0.278	0.714	5
3	2573	0.157	0.871	6
4	1428	0.087	0.958	7
5	530	0.032	0.991	7
6	101	0.006	0.997	7
7	50	0.003	1.000	7

Equalized Histogram:

Level 1: 3244 pixels

Level 3: 3899 //

Level 5: 4559 //

Level 6: 2573 //

Level 7: 1428 + 530 + 101 + 50 = 2109 pixels

Exercise 7

Y / X	Image				
	1	2	3	4	5
1	3	7	6	2	0
2	2	4	6	1	1
3	4	7	2	5	4
4	3	0	6	2	1
5	5	7	5	1	2

Laplacian mask		
0	1	0
1	-4	1
0	1	0

Low pass filter		
0.01	0.1	0.01
0.1	0.56	0.1
0.01	0.1	0.01

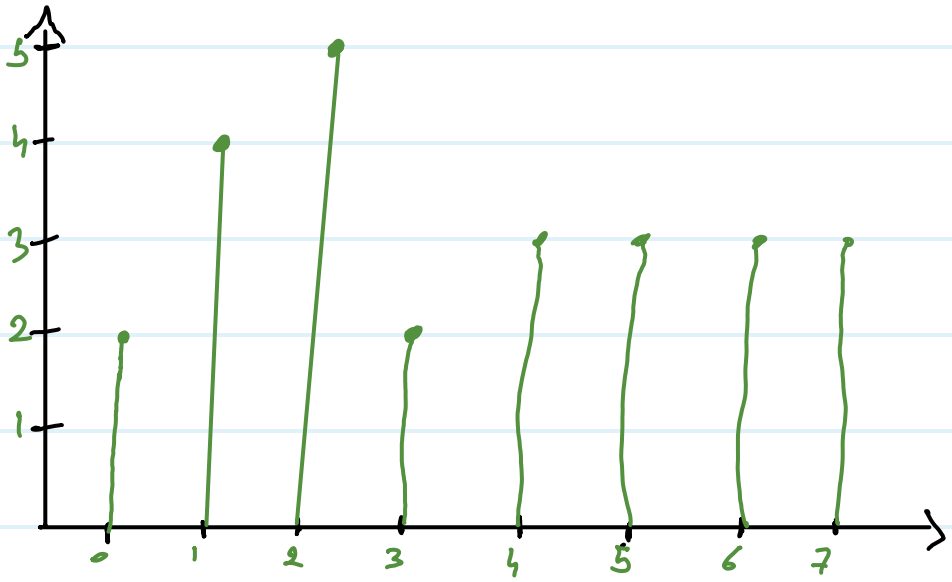
a) $\frac{4+6+1+7+2+5+0+6+2}{9} = 3.6 \simeq 4$

b) $(-4 \times 2) + (6 \times 1) + (7 \times 1) + (5 \times 1) + (6 \times 1)$
$= 16$

c) $(4 \times 0.01) + (6 \times 0.1) + \dots$
$= 3.59 \simeq 4$

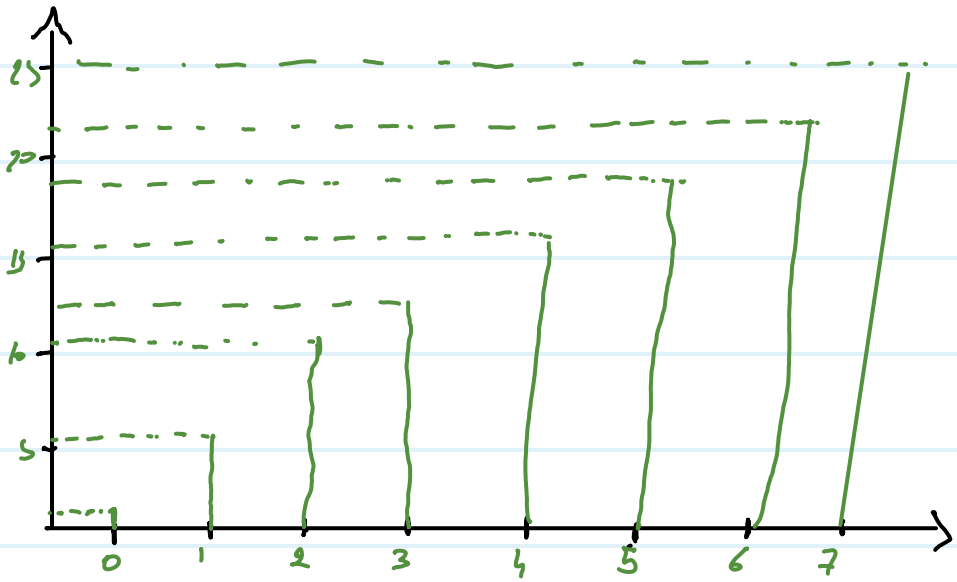
d)

0: 2
1: 4
2: 5
3: 2
4: 3
5: 3
6: 3
7: 3



e)

0: 2
1: 6
2: 11
3: 13
4: 16
5: 19
6: 22
7: 25



Exercise 8

No, filtering relies on the spatial arrangement of pixels. Since the 2 images have different spatial structure, the filtered values will differ => different histograms.

Exercise 9:

a) for K=3, with brute-force: $(2k+1)^2 = 49$ MAD calculation per block.

b) $\frac{8 \times 8}{2 \times 2} = 16$ macro block => $16 \times 49 = 784$ calculations.

c) 784 ns

d) a) first step: $\frac{K}{2}$ => 9 positions, we can't go further $(\frac{K}{4} < 1)$

b) $9 \times 16 = 144$ calculations

c) $144 \times 1 = 144$ ns