Introduction to Machine Vision
(EECS 101)

Homework #3

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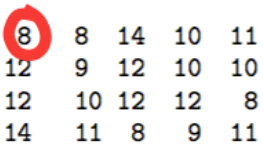
Written Problem:

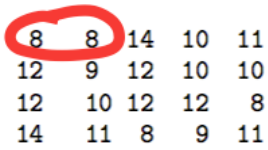
Step 1:



8	8	14	10	11
12	9	12	10	10
12	10	12	12	8
14	11	8	9	11

$$I = 8$$
$$\mu = 8$$
$$\sigma^2 = 0 \qquad \Rightarrow H(R) = TRUE$$

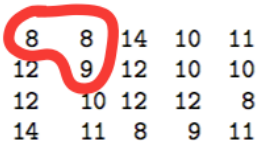
Step 2:



8	8	14	10	11
12	9	12	10	10
12	10	12	12	8
14	11	8	9	11

$$I = 8, 8$$
$$\mu = 8$$
$$\sigma^2 = 0 \qquad \Rightarrow H(R) = TRUE$$

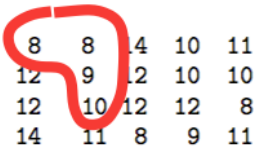
Step 3:



8	8	14	10	11
12	9	12	10	10
12	10	12	12	8
14	11	8	9	11

$$I = 8, 8, 9$$
$$\mu = 8.33$$
$$\sigma^2 = 0.222 \qquad \Rightarrow H(R) = TRUE$$

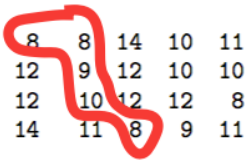
Step 4:



8	8	14	10	11
12	9	12	10	10
12	10	12	12	8
14	11	8	9	11

$$I = 8, 8, 9, 10$$
$$\mu = 8.75$$
$$\sigma^2 = 0.6875 \qquad \Rightarrow H(R) = TRUE$$

Step 5:



8	8	14	10	11
12	9	12	10	10
12	10	12	12	8
14	11	8	9	11

$$I = 8, 8, 9, 10, 8$$

$$\mu = 8.6$$

$$\sigma^2 = 0.64 \qquad \Rightarrow H(R) = TRUE$$

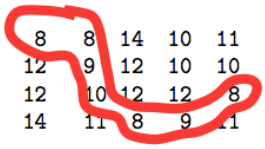
Step 6:

$$I = 8, 8, 9, 10, 8, 9$$

$$\mu = 8.67$$

$$\sigma^2 = 0.56 \qquad \Rightarrow H(R) = TRUE$$

Step 7:

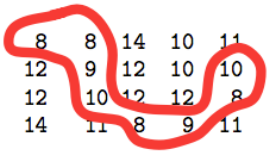


$$I = 8, 8, 9, 10, 8, 9, 8$$

$$\mu = 8.57$$

$$\sigma^2 = 0.53 \qquad \Rightarrow H(R) = TRUE$$

Step 8:

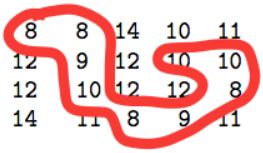


$$I = 8, 8, 9, 10, 8, 9, 8, 10$$

$$\mu = 8.75$$

$$\sigma^2 = 0.69 \qquad \Rightarrow H(R) = TRUE$$

Step 9:



$$I = 8, 8, 9, 10, 8, 9, 8, 10, 10$$

$$\mu = 8.89$$

$$\sigma^2 = 0.77 \qquad \Rightarrow H(R) = TRUE$$

Step 10:

$$I = 8, 8, 9, 10, 8, 9, 8, 10, 10, 10$$

$$\mu = 9$$

$$\sigma^2 = 0.8 \qquad \Rightarrow H(R) = TRUE$$

The rest has $H(R) = FALSE$

Therefore:

The first region that will be generated is:

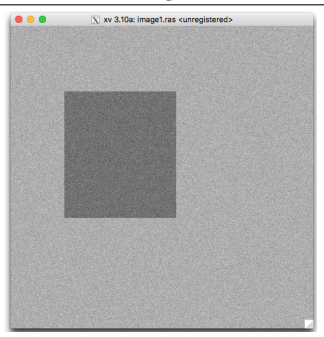
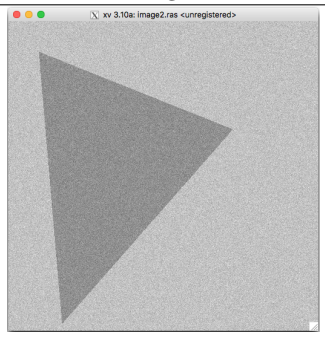
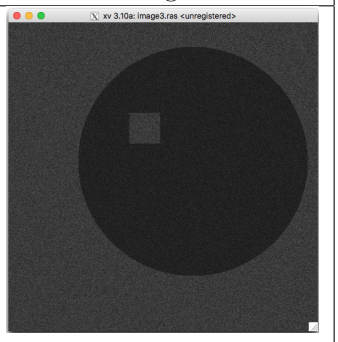
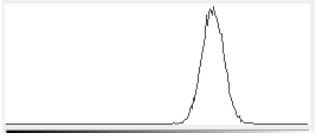
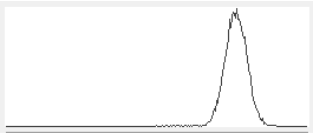
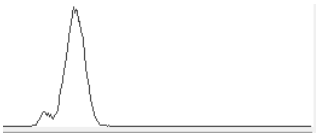
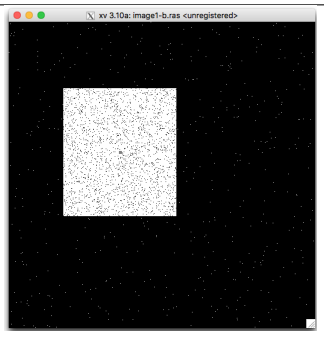
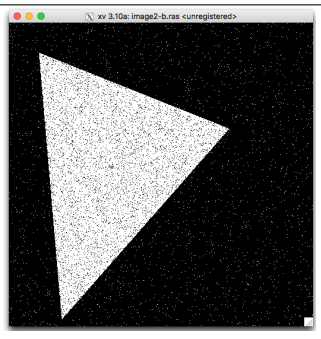
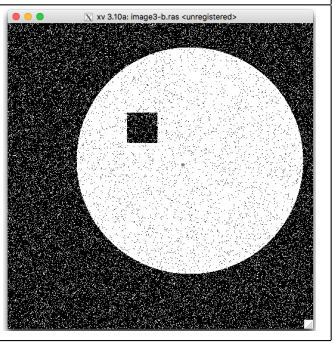
Mean:

$$\boxed{\mu = 9}$$

Sample Variance:

$$\boxed{\sigma^2 = 0.8}$$

Computer Problem:

	image1	image2	image3
Gray level image:			
Histogram image:			
Threshold:	137	164	47
Area:	38713	65843	125550
X:	218	243	237
Y:	186	173	293
Binary Image:			

NOTE: I used white color for the object and black for the background so that one can see the center more clearly.