Homework-5 Solutions

Question 1

The picture P is specified below:

$$P =$$

	$x = 0$	$x = 1$	$x = 2$	$x = 3$	$x = 4$	$x = 5$	$x = 6$	$x = 7$
$y = 0$	0	0	0	9	9	9	9	9
$y = 1$	0	0	0	9	9	9	9	9
$y = 2$	0	0	0	9	9	9	9	9
$y = 3$	0	0	0	9	9	9	9	9
$y = 4$	0	0	0	9	9	9	9	9
$y = 5$	0	0	0	9	9	9	9	9
$y = 6$	0	0	0	9	9	9	9	9

A.

What picture is obtained if noise cleaning is applied to P, using the technique of smoothing with the following mask:

$$\frac{1}{9} \begin{array}{|c|c|c|} \hline 1 & 1 & 1 \\ \hline 1 & 1 & 1 \\ \hline 1 & 1 & 1 \\ \hline \end{array}$$

Compute the answer only for the window of 3 rows and 5 columns specified below.

	$x = 1$	$x = 2$	$x = 3$	$x = 4$	$x = 5$
$y = 2$	0	3	6	9	9
$y = 3$	0	3	6	9	9
$y = 4$	0	3	6	9	9

B.

What picture is obtained if noise cleaning is applied to P, performed by median filtering over a cross shaped neighborhood as shown below:

$$\begin{array}{|c|c|c|} \hline   & X &   \\ \hline X & X & X \\ \hline   & X &   \\ \hline \end{array}$$

Compute the answer only for the window of 3 rows and 5 columns specified below.

	$x = 1$	$x = 2$	$x = 3$	$x = 4$	$x = 5$
$y = 2$	0	0	9	9	9
$y = 3$	0	0	9	9	9
$y = 4$	0	0	9	9	9

C.

What picture is obtained if the Sobel edge detection technique is applied to P ?
Compute the answer only for the window of 3 rows and 5 columns specified below.

	$x = 1$	$x = 2$	$x = 3$	$x = 4$	$x = 5$
$y = 2$	0	36	36	0	0
$y = 3$	0	36	36	0	0
$y = 4$	0	36	36	0	0