

Give all the steps.

- Write the lines $y = x - 2$, $y = 1 - x/2$ in (r, θ) form.

Use the Hough transform to detect the strongest line in the image below.

1*	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

$(5) = 1 + 4$

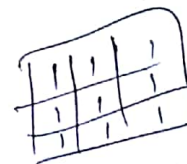
B_i
*
A

- Compute the skeleton of the given image with 3×3 square as structuring element, give two complete steps

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

(5)

$3^2 / 50$



- For image given in Q2, complete the image using convex hull using above structuring element. Give the complete output corresponding one complete step.

(5)

- Find the edges of the image given in Q2 using sobel operator and morphology. Compare and comment on the result.

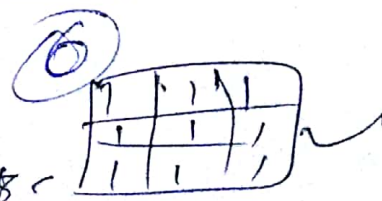
$3 + 3 + 2$ $A - (A \ominus B)$

- For the Grey scale given image (0-7) perform opening with white ball of diameter 3 (radius one unit) as structuring element

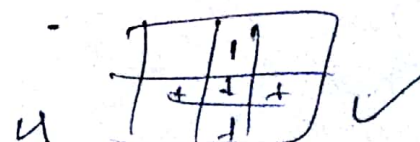
4	4	4	4
4	5	1	2
5	3	3	2
5	3	3	2

(5)

- The contents of a closed box are investigated by taking two X-rays from two directions 90° apart. The two pixel projected images of the amount of absorption are $A_y(y)$ and $A_x(x)$.



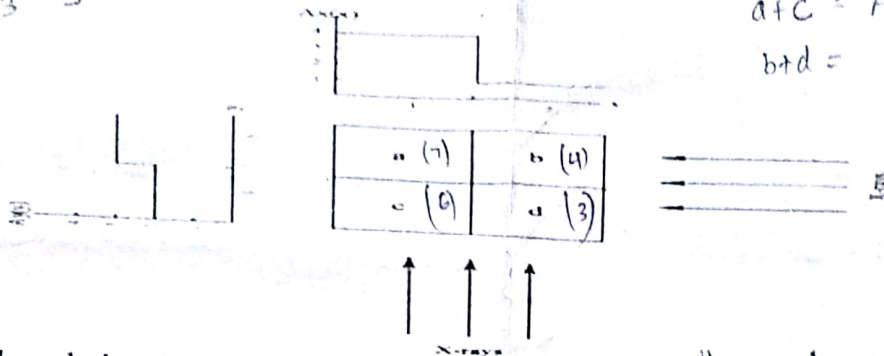
$D_i = A$



4 4 0 0
 4 4 0 0
 3 3 3 2
 3 3 3 2

3 0 0 0
 2 0 0 0
 2 0 0 0
 2 2 1 1

$a+c = A(1)$
 $b+d =$



Write the relationships between the four measurements $A_x(1)$, $A_x(2)$, $A_y(1)$, $A_y(2)$ and estimate four unknowns a, b, c, d from these projection, Is this estimate unique

7. Please plot the histogram of the following image (0-7).

4	4	4	4	5
4	5	1	2	3
5	3	3	2	2
5	3	3	2	1
5	1	2	2	2

$2+2+2$

Plot histogram the above image after equalization of according to the formula:

$$T(x) = \text{round} \left[\left(\frac{\text{cdf}(x) - \text{cdf}_{\min}}{N \times N - \text{cdf}_{\min}} \right) * (L - 1) \right]$$

$\left\{ \begin{array}{l} x: \text{pixel value} \\ N: \text{image size} \\ L: \text{max gray scale value} \end{array} \right.$

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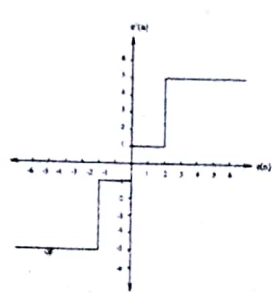
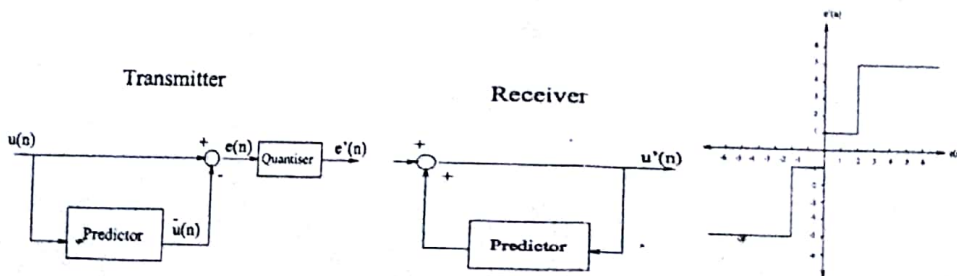
Please output the resultant image and its corresponding histogram.

(c) What will happen if we apply histogram equalization to the result of (b) again? Comment without calculation.

Let $g(x)$ is reversed version of $f(x)$ i.e. $g(x) = f(N - 1 - x)$. Find the corresponding relation between the DCT of $g(x)$ and $f(x)$.

To achieve higher compression the scheme is used in which differences between pixels are quantised before being transmitted using the quantiser illustrated below and the predictor rule $\hat{u}(n) = u(n - 1)$.

For the following input sequence $u(n) = 101, 110, 107, 108, 105, 102$ what is the output sequence $u'(n)$? Assume the first pixel value is transmitted directly without error so that $u'(1) = u(1)$. Tabulate the values of $u(n)$, $\hat{u}(n)$, $e(n)$, $e'(n)$ and $u'(n)$, for each n .



$a=2$
 $c=2$
 $b=1$
 $d=0$

$e'(n) + \hat{u}$

$c = 4 - k$
 $b = 3 - k$

$d = 2$
 $u = 2$

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