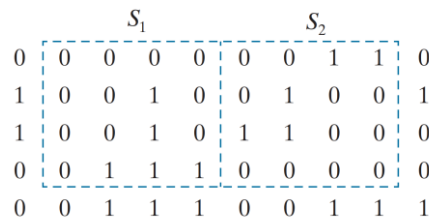# NTUT112-1 Digital Image Processing
Homework Assignment 1
Due 10/11(Wed.) 2023

Question 1:

Consider the two image subsets, S_1 and S_2 in the following figure. With reference to Section 2.5 in textbook, and assuming that $V = \{1\}$, determine whether these two subsets are:

(a) 4-adjacent. (8%)

(b) 8-adjacent. (8%)

(c) m-adjacent. (8%)

	S_1					S_2			
0	0	0	0	0	0	0	1	1	0
1	0	0	1	0	0	1	0	0	1
1	0	0	1	0	1	1	0	0	0
0	0	1	1	1	0	0	0	0	0
0	0	1	1	1	0	0	1	1	1

Question 2:

Consider the image segment shown in the figure that follows.

(a) As in Section 2.5, let $V = \{0,1\}$ be the set of intensity values used to define adjacency. Compute the lengths of the shortest 4-, 8-, and m-path between p and q in the following image. If a particular path does not exist between these two points, explain why. (8%)

(b) Repeat (a) but using $V = \{1,2\}$. (8%)

$$
\begin{array}{cccc}
3 & 1 & 2 & 1\,(q) \\
2 & 2 & 0 & 2 \\
1 & 2 & 1 & 1 \\
(p)\,1 & 0 & 1 & 2
\end{array}
$$
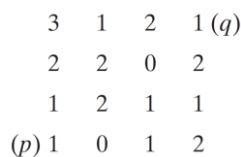
Question 3:

Create a MATLAB m-file of function named "LabelCC" to identify (a) 4-connected components (b) 8-connected components and label them in either column-wise or row-wise format within a binary image. (60%)

(TA: I have created two files for you, please place them in the same folder. One is named ' LabelCC.m,' which you need to use for implementing your algorithm. The other file is 'HW1Q3_unittest.p,' dedicated to unit testing, and you don't need to make any revisions to it. After completing your implementation, you can type 'runtests('HW1Q3_unittest')' in the Command Window to verify the correctness of your results.

Correct Answer (All pass)	Incorrect Answer (Anyone Failed)

Totals:
  3 Passed, 0 Failed, 0 Incomplete.
  0.0044153 seconds testing time.
	Totals:
	  1 Passed, 2 Failed (rerun), 2 Incomplete.
	  0.010586 seconds testing time.

For example, your test results may appear as shown below. Please ensure that all test cases have passed before submitting your work.)