A Watershed Exercise

From a past exam paper: Consider the image fragment below (in which the numbers represent intensity values)

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

Using letters of the alphabet to label regions, show how this image fragment would be segmented by the *Watershed* algorithm.

A Solution (there are several, based on exactly how the pixels are ordered)

Sort the pixels (using x,y coordinates as on the lecture slides):

(1,1) = 1
(1,2) = 1
(2,1) = 1
(3,4) = 1
(1,3) = 2
(2,2) = 2
(4,2) = 2
(1,3) = 2
(3,4) = 2
(4,4) = 2
(1,4) = 3
(3,2) = 3
(2,3) = 3
(3,3) = 3
(4,1) = 3
(2,4) = 4

For each pixel

- If it's neighbours are all unlabelled, give it a new label
- If it has neighbours with a single label, it gets that label
- If it has neighbours with two or more labels, it is a watershed (W)

A	W	B	B
A	W	W	B
A	A	W	W
A	A	A	W