Level 4

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Rooftop hotspots.

Hotspot = Building rooftops with certain properties:

- › Flat region on top of a construction (e.g. **NOT** on the ground)

- › At least a 4x4 square can fit into it (ex: a 100x2 rooftop is not a hotspot but 100x4 is)

  Task for Level 4:

  Given a site, find the hotspots

Given a 2D height matrix of the site, output the center cell of each hotspot that fits the below criteria.

Constraints that are true for this level:

- › The input is a rectangular grid, in each cell the height is marked, as an integer.
- › The ground is flat, with height = 0
- › All buildings:
  - › have positive height
  - › are rectangular in shape
  - › are flat at the top
  - › Edges are parallel with the coordinate system
  - › If there are cells connected through their edges with the same height, they belong to the same building. If they just touch at corners, they belong to different buildings.

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Input:

**MxN matrix with heights, as for Level 1**

Output:

› List of hotspot centers: id r c ...
  - id - zero based hotspot id based on a sort order (see below);
  - r, c - integer coordinates, row and column, of the the hotspot center cell

› The hotspot center cell is the cell containing the center point of the bounding box of the hotspot.
  If this point lies on the margin of several cells, take the cell with the smallest row/column coordinates.

› Sort hotspot center cells by their coordinates, row-wise (lowest rows first) and column-wise (lowest columns first) if they share the same row coordinate.

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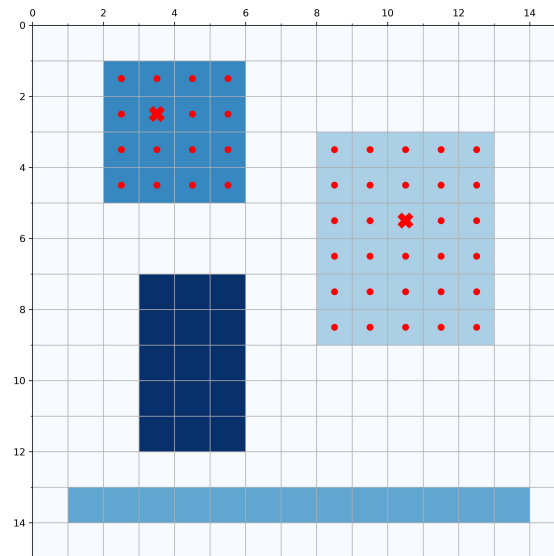
Example:

› There are 4 buildings in the given area

› Since the ones filled with red dots can each fit a 4x4 square, they are considered hotspots, while others do not have the necessary dimensions

› The bounding box (the red dots) for the first building is between the X coordinates 2-5 and Y coordinates 1-4 (meaning cell coordinates)

› This means that the center cell has the (x, y) coordinates (3.5 , 2.5), which give (3, 2) when rounded down (the red X)

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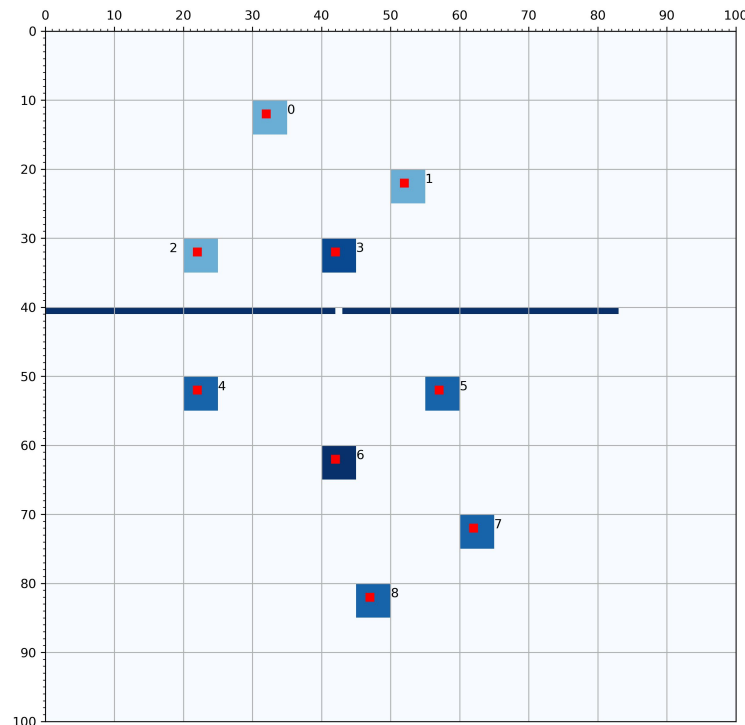
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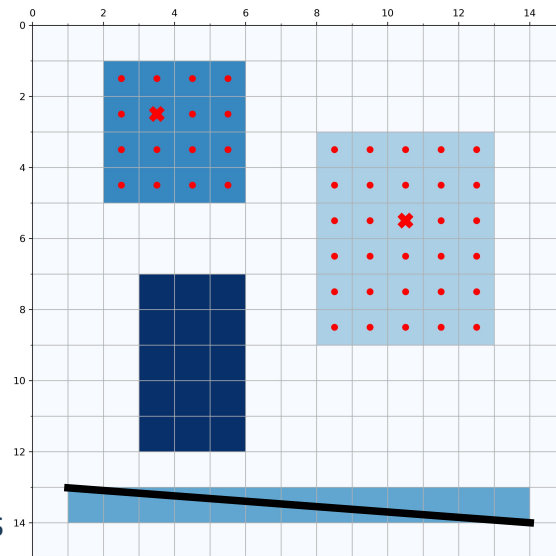
Input format:

<number_of_rows> <number_of_columns>

<height> <height> ….

<height> <height> ….

….

Sample input:
See level4_0.in

Output format:

<id1 r1 c1> <id2 r2 c2> …

Sample output:
0 12 32 1 22 52 2 32 22 3 32 42 4 52 22 5 52 57 6 62 42 7 72 62 8 82 47

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