Worm world

Worms move in horizontal and vertical direction only in a gridded planar world. At certain grids there will be fungus that they eat. Given initial position of a worm, find a short route to find and eat all those fungus and coming back to the original position. See the example below for N=7, M=8, F=7,X=1, the left matrix shows how the cells are numbered and the right one shows an example of an initial position.

A worm world

	1	2	3	4	5	6	7	8
1	1	2	3	4	5	6	7	8
2	9	10	11	12	13	14	15	16
3	17	18	19	20	21	22	23	24
4	25	26	27	28	29	30	31	32
5	33	34	35	36	37	38	39	40
6	41	42	43	44	45	46	47	48
7	49	50	51	52	53	54	55	56

	1	2	3	4	5	6	7	8
1	W	.	.	F	.	.	F	.
2	.	.	.	.	.	.	.	F
3	.	.	.	.	.	.	.	.
4	F	.	.	.	.	F	.	.
5	.	.	.	.	.	.	.	.
6	.	.	.	.	.	F	.	.
7	.	.	F	.	.	.	.	.

Input

The first line contains 4 integers, N, M, F, X, which are the world size (NxM), the number of fungus, and the worm initial position (X)
The next line contains F integers, which are the positions of fungus.
$1 < N, M < 20$
$1 < X \leq NxM$
$1 < F < 100$

Output

One line containing the F positions of food positions in the order of visited by the worm.

Example

Input:
7 8 7 1
4 7 16 25 30 46 51

Output:
4 7 16 30 46 51 25

Click on the score to get more information if the score is not 100.