

① spiral Matrix.

↳ print all elemnt in spiral fashion.

$SR = 0$
 $SC = 0$
 $ER = 3 = (n-1)$

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

$SR = 2$ } Not possible!!
 $ER = 1$

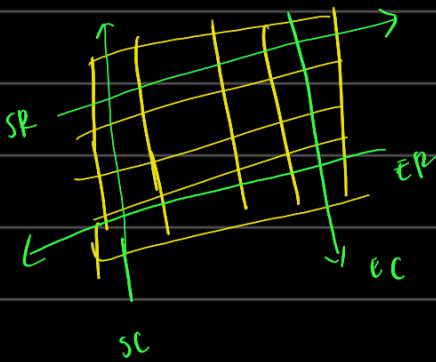
$ER = 3 = (n-1)$

Approach:

Start Row $\rightarrow 0$ $SR \rightarrow 1$
 End Row $\rightarrow 3$ $ER \rightarrow 2$
 Start col $\rightarrow 0$ $SC = 1$
 End col $\rightarrow 3$ $EC = 2$

while ($SR \leq ER$ & $SC \leq EndCol$)
 Print \rightarrow top, Right, bottom, left.

output : 1 2 3 4 8 12 16 15 14 13 9 5 6 7 11 10



Diagonal Sum:

For $n = \text{odd}$.

1	2	3
4	5	6
7	8	9

$\rightarrow \begin{bmatrix} 1+5+9 \\ +3+7 \end{bmatrix} = 25$
 5 should be included twice

Diagonal Sum

$n = m$

$n \times n$
 $n = \text{even} = 4$

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

LT (Left to Right) RT (Right to Left)
 LB (Left to Bottom) BR (Right to Top)

PD = $1 + 6 + 11 + 16 = 34$
 SD = $4 + 7 + 10 + 13 = 34$
 Total = $34 + 34 = 68$

Primary $\rightarrow (0,0), (1,1), (2,2), (3,3)$
 Secondary $\rightarrow (0,3), (1,2), (2,1), (3,0)$

Search

Search in Sorted Matrix

Approach

① Brute force
 $O(n^2)$

row wise
col wise

② Row wise
 $O(n \log n)$

10	20	30	40
15	25	35	45
27	29	37	48
32	33	39	50

$(n-1, 0)$

key < cell value
TOP

key > cell value
RIGHT

$(0, m-1)$

key < cell value
LEFT

key > cell value
BOTTOM

Staircase Search

→ top right

$i = 0,$

$j = \text{cols} - 1$

if key < cellval :
 $j--$ [move left in same row]

elif key > cellval :
 $i++$ [move bottom in same col]

$i = \text{row}$
 $j = \text{col}$

10	20	30	40
15	25	35	45
27	29	37	48
32	33	39	50

→ consider key = 31

① $31 < 40 \rightarrow \text{left}$

② $31 > 30 \rightarrow \text{bottom}$

③ $31 < 35 \rightarrow \text{left}$

④ $31 > 25 \rightarrow \text{bottom}$

⑤ $31 > 29 \rightarrow \text{bottom } i=2, j=1$

⑥ $31 < 33 \rightarrow \text{left } i=3, j=1$

⑦ $31 < 32 \rightarrow \text{left } i=3, j=0$

$i=3, j=1$

$j \geq 0$

consider $k = 34$

$34 > 29 \rightarrow \text{bottom } \rightarrow 2, 1$

$34 > 33 \rightarrow \text{bottom } \rightarrow 3, 1$

$\rightarrow 4, 1$

i should be less than 4
 $i < \text{num rows}$