


867. Transpose Matrix

Easy   3070   427   Add to List   Share

Given a 2D integer array `matrix`, return the **transpose** of `matrix`.

The **transpose** of a matrix is the matrix flipped over its main diagonal, switching the matrix's row and column indices.

|     |    |    |
|-----|----|----|
| 2   | 4  | -1 |
| -10 | 5  | 11 |
| 18  | -7 | 6  |



|    |     |    |
|----|-----|----|
| 2  | -10 | 18 |
| 4  | 5   | -7 |
| -1 | 11  | 6  |

Row  $\Leftrightarrow$  Col.

|               |   |   |   |   |   |   |
|---------------|---|---|---|---|---|---|
| $\rightarrow$ | 1 | 2 | 3 | 1 | 4 | 7 |
| $\rightarrow$ | 4 | 5 | 6 | 2 | 5 | 8 |
| $\rightarrow$ | 7 | 8 | 9 | 3 | 6 | 9 |

$i < j$     $0 < 1$

$i < j$     $1, 0$

|   |                            |                            |                            |
|---|----------------------------|----------------------------|----------------------------|
|   | 0                          | 1                          | 2                          |
| 0 | 1 <sub>0,0</sub>           | <del>4<sub>0,1</sub></del> | <del>3<sub>0,2</sub></del> |
| 1 | <del>2<sub>1,0</sub></del> | 5                          | 6                          |
| 2 | <del>3<sub>2,0</sub></del> | 8                          | 9                          |



|   |   |   |   |
|---|---|---|---|
|   | 0 | 1 | 2 |
| 0 |   |   |   |
| 1 |   |   |   |
| 2 |   |   |   |

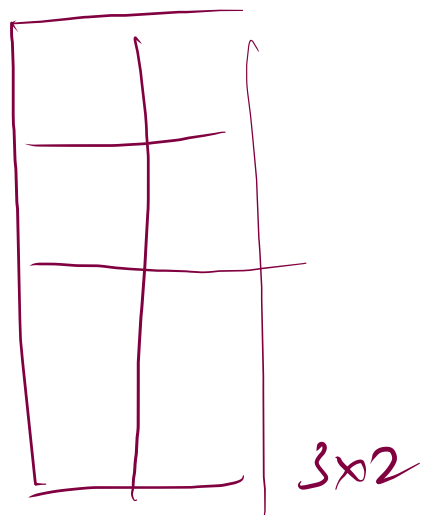
2 x 3



A hand-drawn 2x3 grid. The left side is a straight vertical line, and the right side is a curved line. The grid is divided into six cells by one horizontal and two vertical lines. To the left of the grid, the labels 'r1' and 'r2' are written next to the top and bottom horizontal lines, respectively. A curved arrow points from the top-right corner of the grid towards the right.

|    |  |  |
|----|--|--|
| r1 |  |  |
| r2 |  |  |

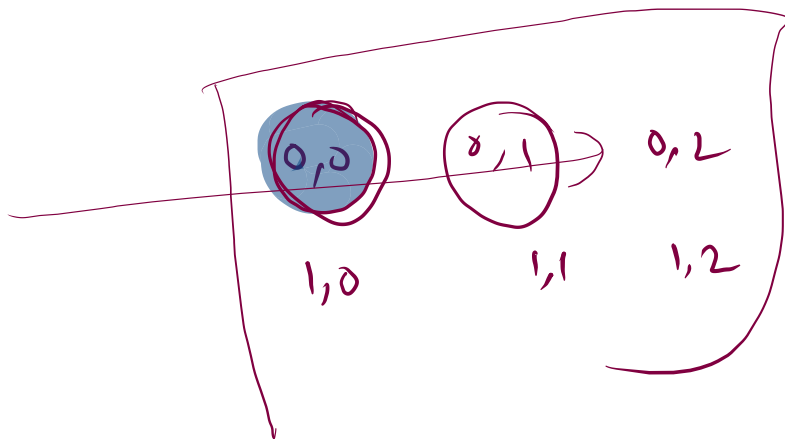
c1 c2




A hand-drawn 3x2 grid. The grid is divided into six cells by two horizontal and one vertical lines. Above the grid, the labels 'c1' and 'c2' are written above the first and second vertical lines, respectively. To the right of the grid, the label '3x2' is written.

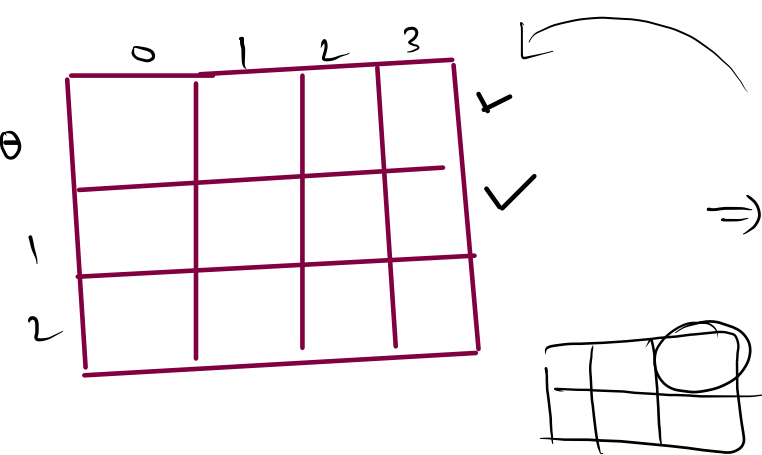
|    |    |
|----|----|
| c1 | c2 |
|    |    |
|    |    |
|    |    |

3x2



$i$     $j$   
 0   1  
 1   0

|   |  |   |
|---|--|---|
|   | 0  | 1 |
| 0 | <br>$(0,0)$ |   |
| 1 | ✓  |   |
| 2 |  |   |

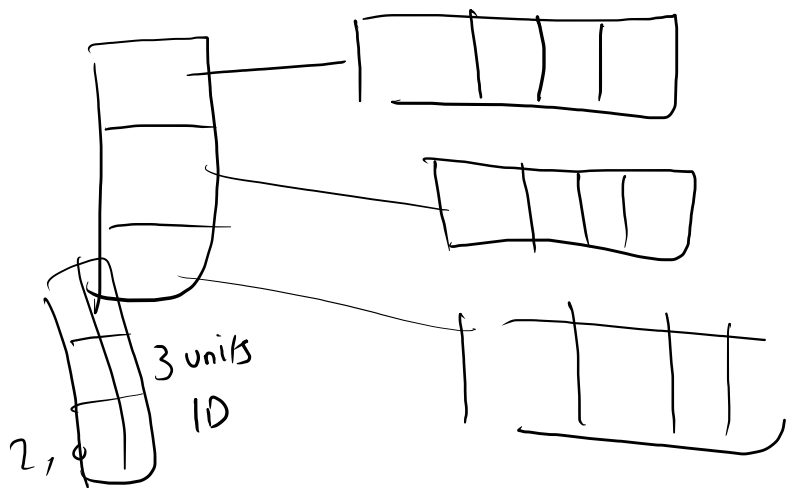


Square

3x3

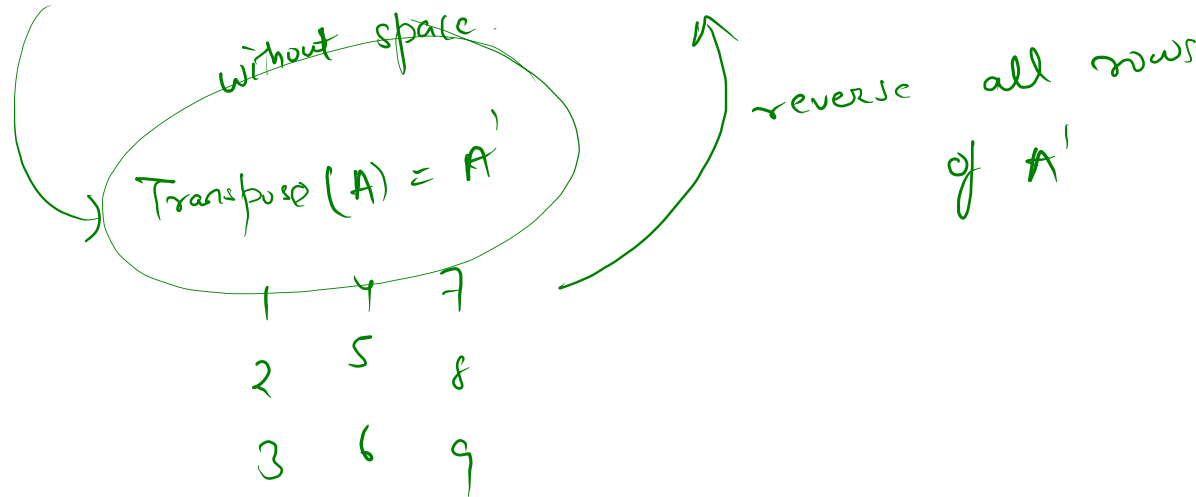
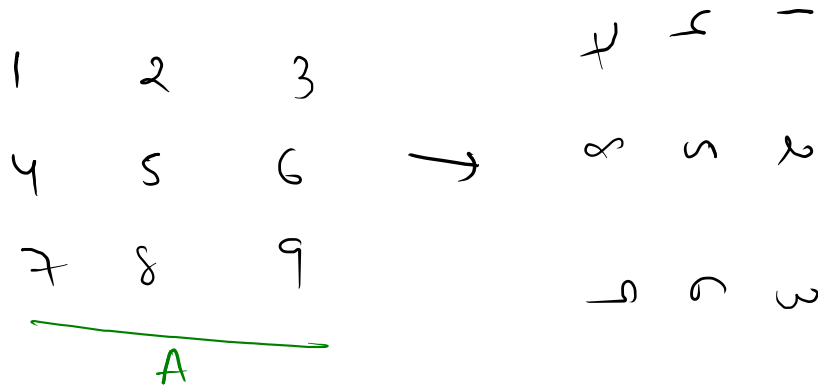
$i < j$

3x3



## 48. Rotate Image

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$$O(m+n)$$

|    |    |    |    |
|----|----|----|----|
| 1  | 3  | 5  | 7  |
| 10 | 11 | 16 | 20 |
| 23 | 30 | 34 | 60 |

$$(m \times n) \rightarrow O(m^2)$$

$$x = 30$$

$$me = x$$

$$me > x$$

left (j--)

$$me < x$$

down  
(i++)

$$me \quad x$$

$$7 < 30$$

$$20 < 30$$

$$60 > 30$$

|    |    |    |    |
|----|----|----|----|
| 1  | 3  | 5  | 7  |
| 10 | 11 | 16 | 20 |
| 23 | 30 | 34 | 60 |

left, down

$$x = 15$$

$$7 < 15$$

$$x = 70$$

$$20 > 15$$

$$16 > 15$$

$$11 < 15$$

$$30 > 15$$

$$23 > 15$$

$$\log(n) \pm \log(m)$$

$$O(\log(n \times m))$$

ceil  
floor

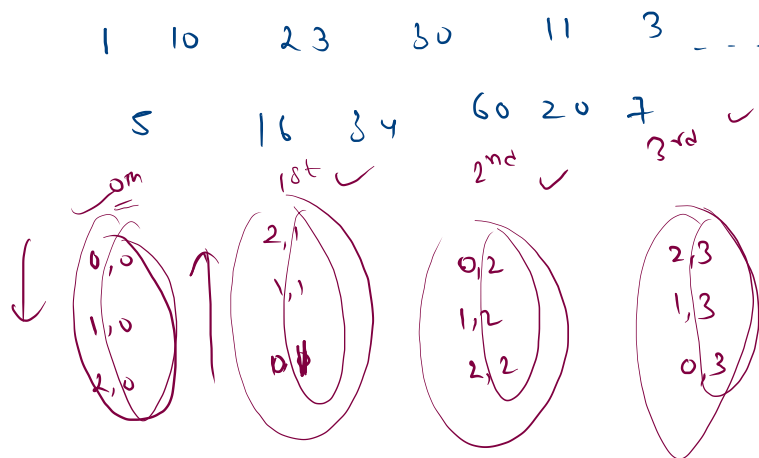
$$4.7 \approx 5$$

$$16$$

$$11$$

# Wave Print

|   | 0  | 1  | 2  | 3  |
|---|----|----|----|----|
| 0 | 1  | 3  | 5  | 7  |
| 1 | 10 | 11 | 16 | 20 |
| 2 | 23 | 30 | 34 | 60 |



fin → out loop

for (  $j = 0 \rightarrow j < n$  (cols) )

{ if (  $j \% 2 == 0$  ) → even

{ for (  $i = 0 \rightarrow i < n$  )

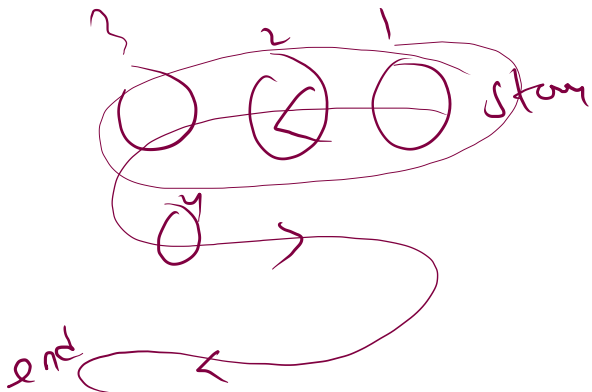
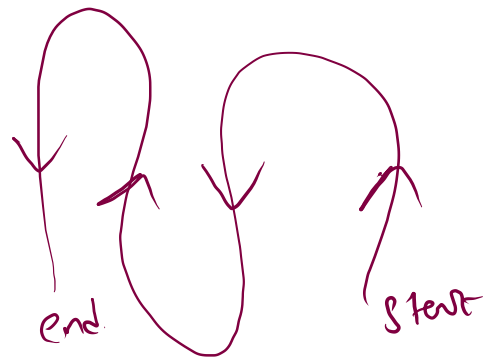
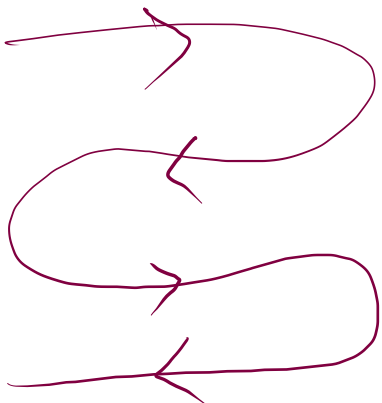
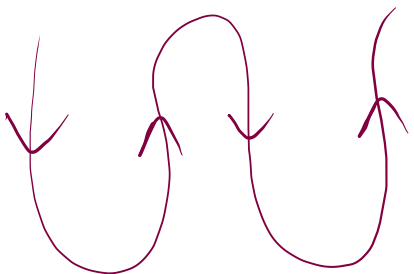
}

else {  $j$  is odd

for (  $i = n - 1 \rightarrow 0$  )

}

}



$$f(i) = 0$$