2D array

array

class data structure, Arrays syntax, syntax

4	10	16	14	15
0	1	2	3	4

10	16	14	15
0	1	2	3

4	5	7	2	8
0	1	2	3	4

10	16	14	15
0	1	2	3

eg: let arr(5) = [1, 3, 5, 7, 8]
console.log (arr.length-1)
console.log(arr[2])

printing the element at index 2

eg- for(let i=0; i<arr.length; i++)
{
console.log(arr[i])
}

printing the elements of the array

2-D arrays [rows, columns]

multiple rows

1) Tables, matrix, grids

m = rows
n = columns

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

m x n - dimension

2x3

Indexing in 2D array

$$\begin{array}{c|ccc} & 0 & 1 & 2 \\ \hline 0 & a & b & c \\ 1 & d & e & f \\ 2 & g & h & i \end{array}$$

arr.

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}_{3\times3}$$

print an element in the 2D array.

console.log(arr[1][1])

print all the elements of the matrix.

(nested loop)

m = rows
n = columns

for all the rows
for all the columns

for(let i=0; i<m; i++)
{
for(let j=0; j<n; j++)
{
console.log(arr[i][j])
}
}

not possible

for(let i=0; i<m; i++)
{
for(let j=0; j<n; j++)
{
console.log(arr[i][j])
}
}

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

2 x 3
n m

i=0
i=1
i=2

(there are errors)

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}_{3\times3}$$

o/p-

i=0 j=0, 1, 2

00 01 02

i=1 10 11 12

20 21 22

o/p → 1 2 3 4 5 6 7 8 9

1 2 3
4 5 6 7 8 9

m=3, n=3

i=0	0	1	2
	00	01	02
i=1	10	11	12
i=2	20	21	22

for(let i=0; i<m; i++)
{
for(let j=0; j<n; j++)
{
console.log(arr[i][j])
}
}

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}_{3\times3}$$

n x m

|| column-wise

	j=0	j=1	j=2
i=0	00	01	02
i=1	01	11	21
i=2	02	12	22

o/p = [1 4 7 2 5 8 3 6 9]

column-wise print

eg.

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}_{n\times n}$$

00 01 02
10 11 12
20 21 22

Print diagnol elements

primary

for(let i=0; i < n; i++)
for(let j=0; j<m; i++)
{
if (i==j)
{
console.log(arr[i][j])
}
}

for(let i=0; i<m; i++)
console.log(arr[i][i])

i=0 → 00
i=1 → 11
i=2 → 22

efficient version

eg-

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}_{3\times3}$$

n x m

00 01 02
10 11 12
20 21 22

print secondary elements

3 5 7
02 11 20

i=0 → i increase by 1.
j=2 → j decr by 1.

i+j=2 i+j=2 i+j=2

for(let i=0; i < n; i++)
for(let j=0; j<m; i++)
{
if (i+j == m-1)
{
console.log(arr[i][j])
}
}

eg-

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}_{n\times m}$$

3x3

00 01 02
10 11 12
20 21 22

print 1st column of the matrix

for(let i=0; i < n; i++)
for(let j=0; j<m; i++)
{ if(j==0) → if (j==m-1)
console.log(arr[i][j])

print last column

eg-

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}_{n\times n}$$

00 01 02
10 11 12
20 21 22

Algorithm
1. first row
2. Secondary diag
3. last row.

[00 01 02 11 20 21 22]

if (i==0 || i==n-1 || j==n-1)

for(_____) || first row.
for(_____)
if (i==0)
console

for( )
for( ) if (i==1 && j==1) ||
for( )
for( )
if (j==n-1)
console.log( )

$$\begin{bmatrix} 1 & 2 & 3 & \cancel{X} \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \\ \cancel{X} & 14 & 15 & 16 \end{bmatrix}$$

if (i+j = n-1 && i = 0 && j = n-1)

Home Work

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

N (i = 0)