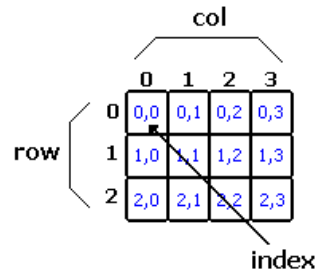# 1. Array of Two Dimension:

Arrays can have higher dimension. There can be arrays of two dimension which is array of arrays. It is accessed with two index. Also there can be arrays of dimension higher than two.

data-type Array-name [Row-size] [Col-size];
Examples:

         int a [10] [10];
        int num [3] [4];

2. Initializing 2D-Array Elements:
- The first element of array age:
  a [2] [3] = { {1, 2, 3} , {4, 5, 6} };

1	2	3
4	5	6

3. Read / Write / Process Array Elements

Ex1:- Write C++ program, to read 15 numbers, 5 numbers per row, the print them:

```
#include<iostream.h>
void main ( )
{
int a [ 3 ] [ 5 ];
int i , j;
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 5; j++ )
cin >> a [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
{
for ( j = 0 ; j < 5; j++ )
cout << a [ i ] [ j ];
cout << endl;
}
}
```

Ex2:- **Write C++ program, to read 4*4 2D-array, then find the summation of the array elements, finally print these elements:**

```
#include<iostream.h>
void main ( )
{
int a [ 4 ] [ 4 ];
int i , j, sum = 0;
for ( i = 0 ; i < 4; i++ )
for ( j = 0 ; j < 4; j++ )
cin >> a [ i ] [ j ];
for ( i = 0 ; i < 4; i++ )
for ( j = 0 ; j < 4; j++ )
sum += a [ i ] [ j ];
cout << "summation is: " << sum << endl;
for ( i = 0 ; i < 4; i++ )
{
for ( j = 0 ; j < 4; j++ )
cout << a [ i ] [ j ];
cout << endl;
}
}
```

Ex3:- **Write C++ program, to read 3*4 2D-array, then find the summation of each row:**

```
#include<iostream.h>
void main ( )
{
int a [ 3 ] [ 4 ];
int i , j, sum = 0;
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
cin >> a [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
{
sum = 0;
for ( j = 0 ; j < 4; j++ )
sum += a [ i ] [ j ];
cout << "summation of row " << i << " is: " << sum << endl;
}
}
```

Ex4:- Write C++ program, to read 3*4 2D-array, then replace each value equal 5 with 0:

```cpp
#include<iostream. h>
void main ( )
{
int a [ 3 ] [ 4 ];
int i , j;
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
cin >> a [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
if ( a [ i ] [ j ] == 5 ) a [ i ] [ j ] = 0;
for ( i = 0 ; i < 3; i++ )
{
for ( j = 0 ; j < 4; j++ )
cout << a [ i ] [ j ];
cout << endl;
}
}
```

Ex5:-Write C++ program, to addition two 3*4 arrays:

```cpp
#include<iostream. h>
void main ( )
{
int a [ 3 ] [ 4 ], b [ 3 ] [ 4 ], c [ 3 ] [ 4 ];
int i , j;
cout << "enter element of array A: \n";
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
cin >> a [ i ] [ j ];
cout << "enter element of array B: \n";
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
cin >> b [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
c [ i ] [ j ] = a [ i ] [ j ] + b [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
{
for ( j = 0 ; j < 4; j++ )
cout << c [ i ] [ j ];
cout << endl;
}
}
```

Ex6:-Write C++ program, to convert 2D-array into 1D-array:

```
#include<iostream.h>
void main ( )
{
int a [ 3 ] [ 4 ];
int b [ 12 ];
int i , j, k = 0;
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
cin >> a [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 4; j++ )
{
b [ k ] = a [ i ] [ j ];
k++;
}
for ( i = 0 ; i < k; i++ )
cout << b [ i ];
}
```

Ex7:-Write C++ program, to replace each element in the main diameter (diagonal) with zero?

```
#include<iostream.h>
void main ( )
{
int a [ 3 ] [ 3 ];
int i , j;
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 3; j++ )
cin >> a [ i ] [ j ];
for ( i = 0 ; i < 3; i++ )
for ( j = 0 ; j < 3; j++ )
if ( i == j ) a [ i ] [ j ] = 0;
for ( i = 0 ; i < 3; i++ )
{
for ( j = 0 ; j < 3; j++ )
cout << a [ i ] [ j ];
cout << endl;
}
}
```

0,0	0,1	0,2
1,0	1,1	1,2
2,0	2,1	2,2

i = j

0,0	0,1	0,2
1,0	1,1	1,2
2,0	2,1	2,2

i + j = n-1

0,0	0,1	0,2
1,0	1,1	1,2
2,0	2,1	2,2

i > j

0,0	0,1	0,2
1,0	1,1	1,2
2,0	2,1	2,2

i < j

Ex8:- Write C++ program, print the square root of an array?

```cpp
#include<iostream. h>
void main ( )
{
int a [ 3 ] [ 3 ] , b [ 3 ] [ 3 ];
int i , j;
for ( i = 0 ; i < 3; i++ ) {
for ( j = 0 ; j < 3; j++ ) {
b[ i ][ j ]= sqrt(a[ i ][ j ]);
cout << b [ i ] [ j ];
} } }
```

Ex9:- Write C++ program, to read 3*3 2D-array, then find the summation of the main diagonal and its secondary diagonal of the array elements, finally print these elements:

```cpp
#include<iostream. h>
void main ( )
{
int a [ 3 ] [ 3 ];
int i , j, x , y;
for ( i = 0 ; i < 3; i++ ) {
for ( j = 0 ; j < 3; j++ ) {
cin >> a [ i ] [ j ];
if ( i == j )
x=x+a[ i ][ j ];
if ( i + j =4)
y=y+a[ i ][ j ];
} }
cout << "summation of diagonal is: " << x << endl;
cout << "summation of inverse diagonal is: " << y << endl;
}
```

WORK SHEET (6)
Arrays

Q1: Write a C++ program, using function, to find if the array's elements are in order or not.

Q2: Write a C++ program, using function, to compute the number of zeros in the array.

Q3: Write a C++ program, using function, to find the value of array C from add array A and array B. C[i] = A [i] + B [i];

Q4: Write a C++ program, using function, to multiply the array elements by2. A[i] = A [i] * 2;

Q5: Write a C++ program, using function, to reads temperatures over the 30 days and calculate the average of them.

Q6: Write a C++ program, using function, to merge two arrays in one array.

Q7: Write C++ program, to read 3*4 2D-array, then find the summation of each col.

Q8: Write C++ program, to replace each element in the second diameter (diagonal) with zero.

Q9: Write C++ program, to replace the elements of the main diameter with the elements of the second diameter.

Q10: Write C++ program, to find the summation of odd numbers in 2D-array.

Q11: Write C++ program, to find (search) X value in 2D-array, and return The index of it's location.

Q12: Write C++ program, to convert 1D-array that size [16] to 2D-array That size of [4] [4].

Q13: Write C++ program, to read A[n, n] of character, then find array B and array C, such that B contain only capital letters and C contain only small letters.

Q14: Write C++ program, to read A[n, n] of numbers, then put 10
Instead each even positive number.

Q15: Write C++ program, to read A[n, n] of numbers, then put 10
Instead each even positive number in the first diagonal.

Q16: Write C++ program, to read A[n, n] of numbers, then find the
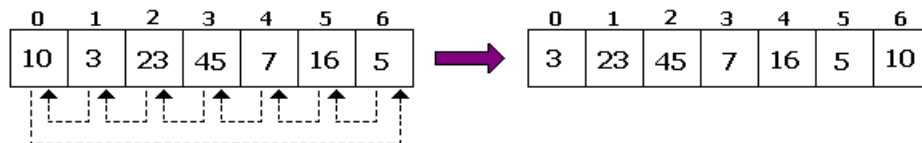minimum number in array.

Q17: Write C++ program, to exchange row1 and row3 in 4*3 array.

Q18: Write C++ program, to exchange row0 with col3 in 4*4 array.

Q19: Write C++ program, to find the greatest number in the second
diagonal, in 3*3 array.

Q20: Write C++ program, to read X[n], and rotate the elements to the
left by one position.
  i.e:

0	1	2	3	4	5	6
10	3	23	45	7	16	5

➡

0	1	2	3	4	5	6
3	23	45	7	16	5	10

Q21: Write C++ program, to read A[n] and a location Z then delete the
number at location Z from the array, and print the new array after
deletion.

Q22: Write C++ program to order the array in ascending and descending
order.

Q23: Write C++ program to read (n) no.s and find the average of the even
no. on it.

Q24: Create the array (b) from (a).
            1 2 3   6
            4 5 6   10
            7 8 9   10

Q25:Create the arrays bellow.

```
1 1 1 1      2 1 1 1
2 2 2 2      1 2 1 1
3 3 3 3      1 1 2 1
4 4 4 4      1 1 1 2
```