Subarrays

for a given array, print the subarrays $(n \times (n+1)/2)$

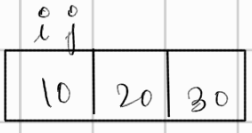
Eg: 10 20 30 ⟶

10
10 20
10 20 30
20
20 30
30

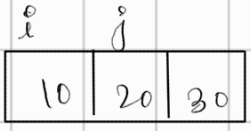
Pick a starting element from (0 to n-1) → i (i++)
| Pick an ending index from (i to n-1) → j (j++)
| | Print array from i to j

Dry Run

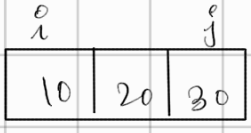
START



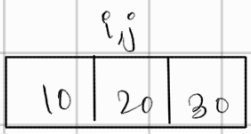
i=0, j=0, print arr[0]



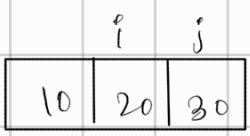
i=0, j=1, print arr[0] + " " arr[1]



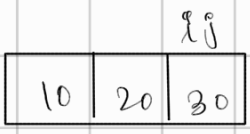
i=0, j=2, print arr[0]+" "+arr[1]+" "+arr[2]



i=1, j=1, print arr[1]



i=1, j=2, print arr[1] + " " + arr[2]



i=2, j=2, print arr[2]

END

To print array from i to j, use another loop from i to j

Subsets

Eg: 10 20 30 ⟶

			In 0-1			Convert decimal
—	—	—	0	0	0	0
—	—	30	0	0	1	1
—	20	—	0	1	0	2
—	20	30	0	1	1	3
10	—	—	1	0	0	4
10	—	30	1	0	1	5
10	20	—	1	1	0	6
10	20	30	1	1	1	7

Take decimal numbers from 0 to $2^n - 1$

↓

Convert them into binary

↓

Print corresponding subset

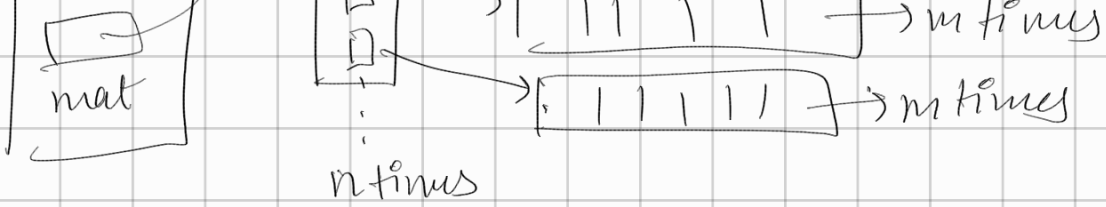
CODE

```
int totalSubsets = (int)Math.pow(2, n);
for (int dec = 0; dec < totalSubsets; dec++) {
    int binaryN = decToBin(int dec)
```

2 D - array.

In C++, contiguous single memory block

In Java, array of reference of multiple 1-d arrays stored & base address of this reference array is stored in matrix naming variable



the 1d array blocks can be stored in any order randomly

The addresses are stored in extra space

To make jagged array,

```
int[] mat = new int[3][];          // no. of arrays in mat 3
for(int i=0; i<3; i++){
    int size = sc.nextInt();       // input size variable
    mat[i] = new int[size];        // makes variable sized array
}
```

① 2D arrays DEMO

CODE

```
Scanner sc = new Scanner(System.in);
int n = sc.nextInt(), m = sc.nextInt();
int[][] mat = new int[n][m];
for(int i=0; i<n; i++){
    for(int j=0; j<m; j++){
        mat[i][j] = sc.nextInt();
    }
}
for(int i=0; i<n; i++){
    for(int j=0; j<n; j++){
        System.out.print(mat[i][j] + " ");
    }
    System.out.println("");
}
```