# BRANCH:CSE/IT Batch-Hinglish

## Data structure &Programming
## Arrays

**DPP-02**

**[NAT]**

**1.** Consider a lower triangular 2D array arr[][5] with 15 elements. The number of rows in arr is- _____

**[NAT]**

**2.** Consider an integer 2D array a[-7 to +7] [-7 to +7] that stores an upper triangular matrix uppertm where uppertm[i][j] is 1 for all i>=j. The sum of all the elements in the array is _____.

**[NAT]**

**3.** Consider an integer lower triangular 2D array arr[-16 to +15][-16 to +15] having base address 1000. If the size of the integer is 4 bytes, the address of the element arr[8][7]is- _____

**[NAT]**

**4.** Consider an integer upper triangular 2D array arr[-8 to +7][-8 to +7] having base address 1000. If the size of integer is 4 bytes, the address of the element present at location arr[-6][4] is- _____.

**[NAT]**

**5.** Consider the natural numbers starting from 1 are stored in a lower triangular matrix arr[-3 to 3][-3 to 3]. Find the element present at location arr[1][2]. _____

**[NAT]**

**6.** Consider the natural numbers starting from 1 are stored in a upper triangular 2D array arr[-3 to 3][-3 to 3]. Find the element present at location arr[1][2]. _____.

**[NAT]**

**7.** Consider a 2D array arr[-4 to +4][-4 to 4] stores an upper triangular matrix. Find the address of the location arr[-1][-2] if the starting address of the array is 500 and size of each element is 8 bytes. Assume that elements are stored in column-major order. _____

**[NAT]**

**8.** Consider a 2D array arr[-4 to +4][-4 to +4] stores a lower triangular matrix. Find the address of the location arr[-2][-1] if the starting address of the array is 500 and size of each element is 8 bytes. Assume, that elements are stored in column major order. _____

# Answer Key

1. **(5)**
2. **(120)**
3. **(2292)**
4. **(1132)**
5. **(13)**
6. **(25)**
7. **(564)**
8. **(644)**

# Hints and Solutions

**1. (5)**

A lower triangular matrix is always a square matrix.
So, the number of rows in the array = 5.

**2. (120)**

Number of rows=Number of columns=7+7+1=15.

The sum of all elements-

= 15 +14 + 13 +……+ 3 + 2 + 1

= 120

**3. (2292)**

The address of the element arr[8][7] is-

$$= 1000 + \left(\frac{(8+16)(8+16+1)}{2} + (7+16)\right) \times 4$$

= 2292

**4. (1132)**

Number of non-zero elements in the $-8^{th}$ row = 15
Number of non-zero elements in the $-7^{th}$ row = 14

The address of arr[-6][4]-

= 1000 + (15+14+4)*4
= 1132

**5. (13)**

The element present at arr[1][2] in lower triangular matrix:

= 1 + 2 + 3 + 4 + 1 +1 +1
=13.

**6. (25)**

Number of elements in each row/column=3+3+1=7

The element present at arr[1][2] in upper triangular matrix:

= 7 + 6 + 5 + 4 + 1 + 1 + 1
= 25

**7. (564)**

Number of elements in each row= 4+4+1=9

When stored in column-major order, upper triangular matrix becomes lower triangular.

The number of non-zero elements from arr[-4][0] to arr[-1][-2]
= 1+2+3+3=9

The address of the element arr[-1][-2] is-

= 500 + (9-1)*8

= 564

**8. (644)**

Number of elements in each row= 4+4+1=9

When stored in column-major order, lower triangular matrix becomes upper triangular.

The number of non-zero elements from arr[-4][0] to arr[-2][-1]
= 9+8+2=19

The address of the element arr[-2][-1] is-

= 500 + (19-1)*8

= 644