

User_Value to Point Conversion and Vice - Versa :

1) From Value to Points :

Type equation here. **When,**

No of Rows , Cols = N

Total no of elements (E) = $N * N$ ($1 \leq E \leq N^2$)

But ,

Both the **x_index** and **y_index** starts from **0**.

\therefore Range of **X_index** ($0 \leq x_index \leq N-1$)

\therefore Range of **Y_index** ($0 \leq y_index \leq N-1$)

($4-1=3$)

13	14	15	16
9	10	11	12
5	6	7	8
1	2	3	4
0	1	2	3

($4-1=3$)

Since,

Each **User_Value** is one of the elements inside the grid .

Range of **Element_Index** (Starting from 0) is ($0 \leq Index \leq N^2-1$).

\therefore **User_Value_Index** (Starting from 0) = **User_value – 1** (i)

Then ,

$$X_index = (User_Value_index) \% N$$

$$\therefore x = (User_Value - 1) \% N \quad \dots \quad (ii) \quad \{ \text{from eq(i)} \}$$

$$\therefore y = (User_value - 1) / N \quad \dots \quad (iii) \quad \{ \text{from eq(i)} \}$$

From Points to User_Value :

In the above derivation,

X co-ordinate is the remainder while the Y co-ordinate of the User_value – 1.

Thus,

$$\left(\frac{User_value - 1}{N} \right) + x = y \quad \dots \quad \text{eq (iv)}$$

$$\text{or, } User_value - 1 = N(y - x)$$

$$\therefore User_value = N(y - x) + 1 \quad \dots \quad \text{eq (v)}$$

$$\frac{N \sum User_value - 1}{\sum y_coordinate} - N(y_coordinate)$$