Majic with Matrix

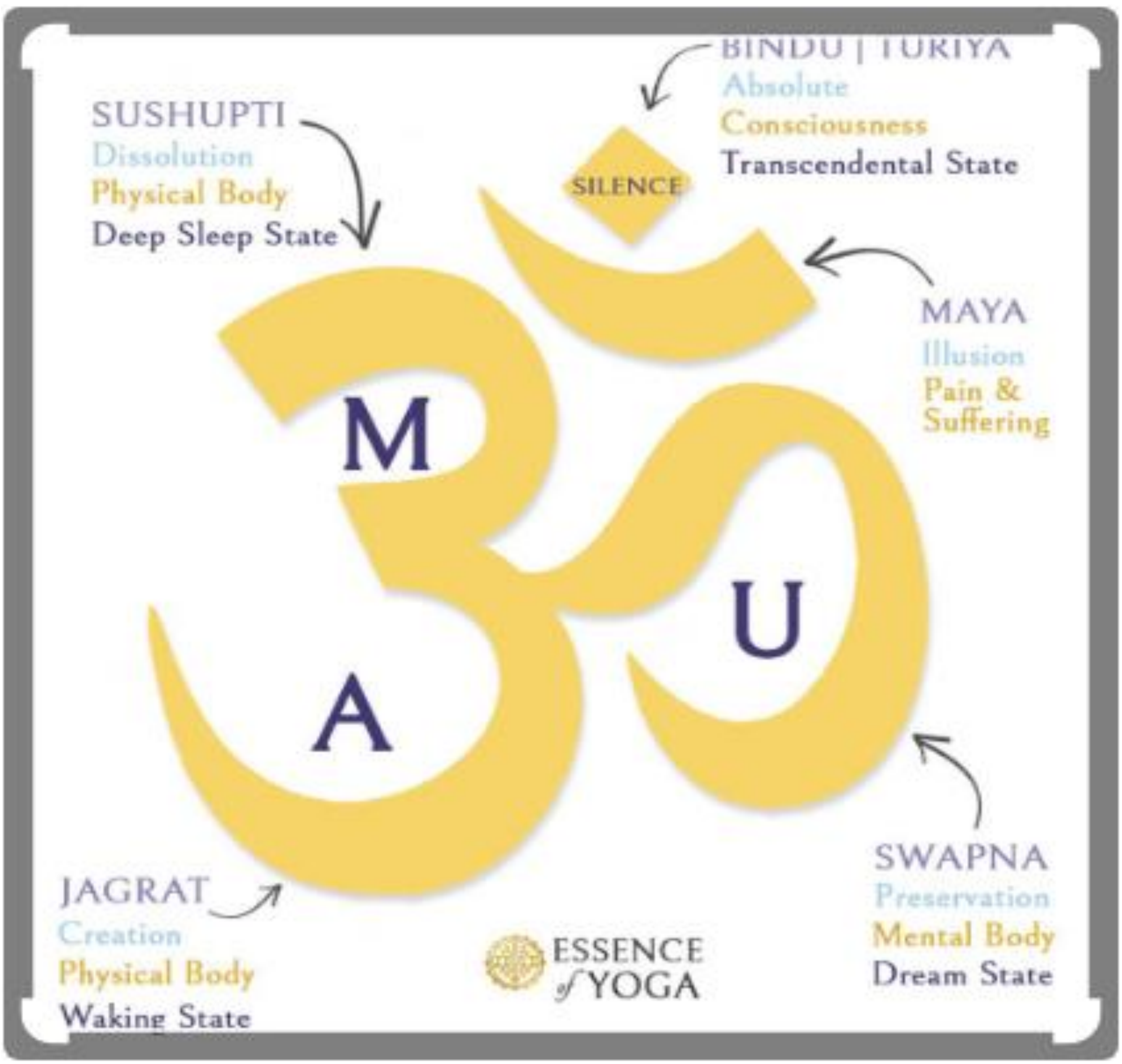
And

Matrix Comparision

(ॐ) In ancient India, the symbol “OM” (or “AUM”) was written in the Brahmi script as a combination of characters that represents its phonetic sounds. The Brahmi script is one of the oldest writing systems used in India and is the ancestor of many modern scripts in South Asia. The representation of “OM” in Brahmi can be broken down phonetically:

1. “A” (H)   2. “U” (∴) and 3: “M” (·/·)

The Brahmi, these characters would be combined to represent the sound of “OM”. The exact visual representation may vary slightly depending on the specific style of the Brahmi script, but the characters themselves remain consistent across the various inscriptions



Moola Prameela & Moola Keshava Reddy

In our school days, whenever we go to Dussehra, Winter or Summar holidays to our hometown, my father used to entertain us by singing Telugu poems. He studied around 5th grade. Without seeing a book, he used to read around 200-300 Telugu poems. One of the poems is the one below which is taken from the Sumathi Sathakam Book (Most of the Telugu people know this poem) which was *written in Telugu in the 13th Century.*

ఆరున్నొక్కటి ఎనిమిది
సారసముగ నేడు నైదు సరగుణ మూడున్
ధీరజ రెండును తొమ్మిది
శ్రీ రాముని కడకు నాలుగు సత్యము సుమతి.

In English translation as is:

ARUNNOKATI (61) ENIMIDI (8)

SARASAMUGA NEDU (7) NAIDU (5) SARAGUNA MUDUN (3)

DEERAJA RENDUNU (2) THOMMIDI (9)

SRIRAMUNI KADAKU NALGU (4) SATYAMU SUMATHI

6	1	8
7	5	3
2	9	4

Introduction: Magic of this Matrix Poem

The magic of the above poem: This poem consists of 1, 2, 3, . . ., 9 and none of the numbers are repeated. If you add column wise or row wise or diagonal, you will get the sum = 15. 1. See Figure 1.1, 2. Extend the lines like in figure-1.2, then 3. Add column wise or row wise or diagonal in figure-1.3 which is the sum = 15

NOTE: It seems, the Sudoku game is also based on this Sumathi Sathakam poem.

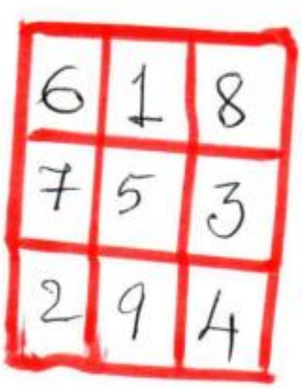


Figure 1.1

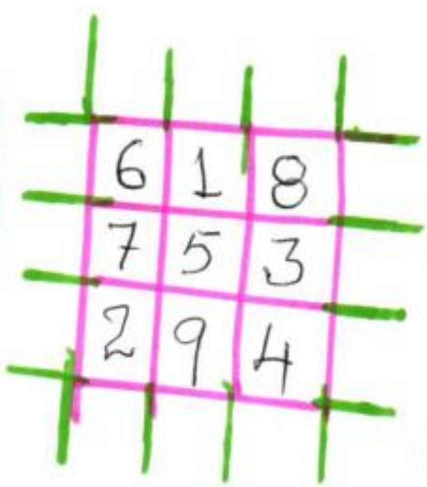


Figure 1.2

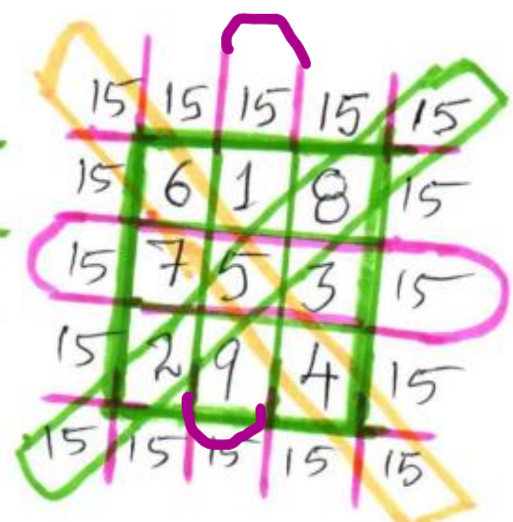


Figure 1.3

History of Sumathi Sathakam (13th Century)

The above poem was written in Sumathi Sathakam Book. The Sumathi Sathakam was *written in the 13th Century.* Sumathi Sathakam is composed of more than 100 poems (padyalu in Telugu) and one of them is the above poem. According to many literary critics Sumathi Sathakam was reputedly composed by Baddena Bhupaludu (1220-1280 CE). He was also known as Bhadra Bhupala.

Baddena Bhupaludu (aka Bhadra Bhupala)

https://en.wikipedia.org/wiki/Sumathi_Satakam

History of Sudoku (20th Century)

The Sumathi Sathakam was *written in the 13th Century* whereas the modern game of *Sudoku version was likely invented by Howard Garns, a retired architect and freelance puzzle designer from Connersville, Indiana, in 1979*. Garns's puzzle, called "Number Place", was first published in the May 1979 issue of Dell Pencil Puzzles and Word Games. However, the game's origins can be traced back to earlier number puzzles, including:

- ***Latin Squares: A game created by an 18th century Swiss mathematician***
- ***French newspaper puzzles: Number puzzles that appeared in French newspapers, such as L'Écho de Paris, for about a decade before World War I.***

The game's name and initial popularity, however, came from Japan. In 1984, Nikoli, Japan's leading puzzle company, discovered Number Place and introduced it to Japanese puzzle fans, naming it Suuji Wa Dokushin Ni Kagiru, which translates to "the numbers must be single" or "the numbers must occur only once". The name Sudoku is a shortened version of this phrase.

https://www.findagrave.com/memorial/25284953/howard_s-garns

https://blog.puzzlenation.com/tag/howard-garns/

Comparison: Sumathi Sathakam Poem vs Sudoku puzzle

Sudoku's simple rules and universal recognition of the numbers 1-9 made it easy to translate across language barriers and cultural boundaries. The game began to gain worldwide popularity in the early 2000s, with puzzles appearing in the Times of London in 2004. Japanese businessman Maki Kaji, the president of Nikoli, is often called "the father of Sudoku" for his role in popularizing the game.

4	3	9	2	6	8	7	1	5
6	7	8	4	5	1	2	3	9
1	5	2	9	3	7	8	4	6
7	9	4	3	1	2	6	5	8
8	1	5	6	4	9	3	7	2
3	2	6	8	7	5	1	9	4
5	8	3	7	9	6	4	2	1
2	4	1	5	8	3	9	6	7
9	6	7	1	2	4	5	8	3

2	8	6	1	9	5	7	4	3
9	7	4	2	3	8	1	6	5
1	3	5	4	7	6	9	2	8
6	5	8	3	1	9	4	7	2
7	2	1	6	5	4	8	3	9
3	4	9	7	8	2	5	1	6
4	9	2	5	6	1	3	8	7
8	6	7	9	4	3	2	5	1
5	1	3	8	2	7	6	9	4

ARUNNOKATI (61) ENIMIDI (8)
SARASAMUGA NEDU (7) NAIDU (5) SARAGUNA MUDUN (3)
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If you cleanly observer the Sudoku picture above, it's a 9X9 matrix which has 9 - 3X3 matrix like in our poem picture 3X3 matrix. Each 3X3 matrix has 1, 2, 3, . . . 9 but in different order in 9X9 matrix not like in our poem and sum of the individual 3X3 matrix rows or column or diagonal are not 15 either. Of course, each row or column of 9X9 matrix also 1, 2, 3, . . . 9 and none of the numbers are repeated but diagonal numbers are repeated and some of the 1,2,3, . . . 9 are missing or some of them repeating too.

Formula to get the sum of 3X3, 5X5, 7X7, and 9X9 matrix.

When I was doing my Bachelor of Education (B. Ed) degree in 1981 at Kakatiya University, Hanamkonda, Telangana, India. We invited a professor from Regional Engineering College (REC), Warangal, Telangana, India to give our class a lecture. I forgot his name but, he earned 4 or 5 PhDs. He gave us a lecture on matrix (3X3, 5X5, 7X7, and 9X9) and (4X4, 6X6, and 8X8) matrix too.

When my father talked about this poem, I didn't know the formula.

The formulae to get the sum = $n (n^2 + 1) / 2$ where n= nXn matrix

Examples:

1. **3X3 matrix, use 1, 2, 3, . . ., 9 and none of them should be repeated. If you add column wise or row wise or diagonal, you will get the sum = 15.**

   $n (n^2 + 1) / 2 = 3 * (3^2 + 1)/ 2 = 3 * (9 + 1) / 2 = 3 * 5 = 15$

2. **5X5 matrix, use 1, 2, 3, . . ., 25 and none of them should be repeated. If you add column wise or row wise or diagonal, you will get the sum should be 65.**

   $n (n^2 + 1) / 2 = 5 * (5^2 + 1) / 2 = 5 * (25 + 1)/2 = 5 * 13 = 65$

3. **7X7 matrix, use 1, 2, 3, . . ., 49 and none of them should be repeated. If you add column wise or row wise or diagonal, you will get the sum should be 175.**

   $n (n^2 + 1) / 2 = 7 * (7^2 + 1) / 2 = 7 * (49 + 1) / 2 = 7 * 25 = 175$

4. **9X9 matrix, use 1, 2, 3, . . ., 81 and none of them should be repeated. If you add column wise or row wise or diagonal, you will get the sum should be 369.**

   $n (n^2 + 1) / 2 = 9 * (9^2 + 1) / 2 = 9 * (81 + 1) / 2 = 9 * 41 = 369$

3X3 Matrix

Moreover, you don't need to remember the poem like 3X3 matrix. It has its own method. Without knowing the poem, you can also do this in 3X3, 5X5, 7X7, or 9X9 matrices.

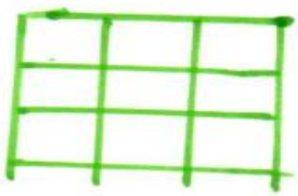

Figure 2.1

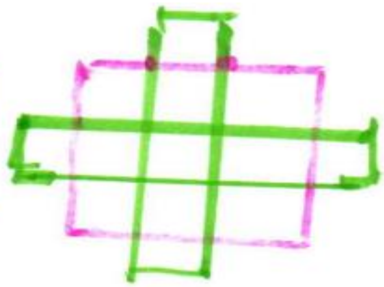

Figure 2.2

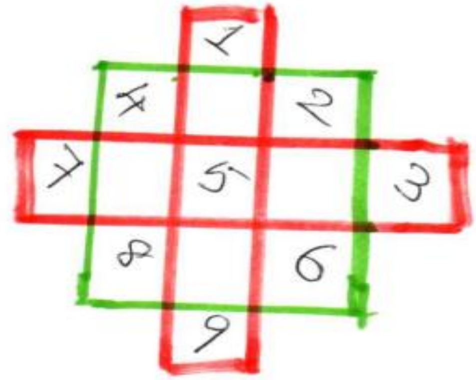

Figure 2.3

Like in figure-2.2 extend the middle rectangles as in green, and write in any order (Start any one of the corner without missing write 1, 2, 3, . ., 9 like in figure-2.3.
NOTE: Only 1, 3, 7, and 9 numbers are outside of our green 3X3 matrix like in figure-2.3.

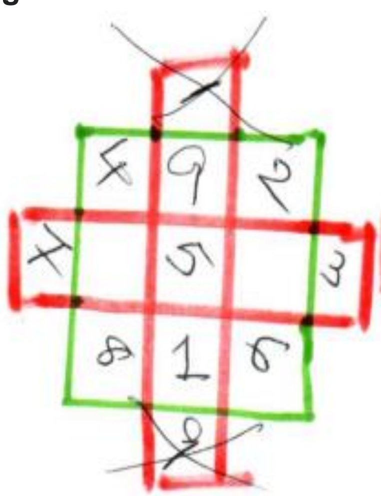

Figure 2.4

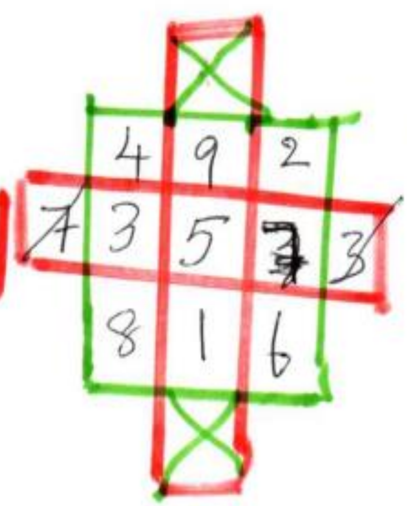

Figure 2.5

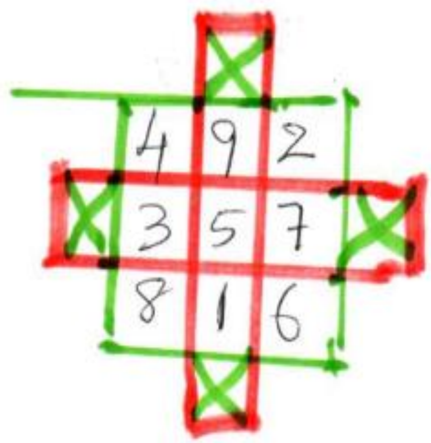

Figure 2.6

Now, we need to bring the outside numbers into the inside 3X3 matrix. Each outside numbers, count 3 up or down or left or right depending on their positions like in figure-2.4 and in figure-2.5 and remove the outside boxes which is our original poem but it's in different order. If you add column wise or row wise or diagonal wise, the sum of the 3X3 matrix = 15

5X5 Matrix

You can also do the same way for 5X5 matrix like in figure-3.1 extend the middle rectangles, and write in any order (Start any one of the corner without missing write 1, 2, 3, . . . , 25 like in figure-5.1.

NOTE: Only 1, 2, 4, 5, 6, 10, 16, 20, 21, 22, 24, and 25 numbers are outside of our original red 5X5 matrix like in figure-3.1.

Now we need to bring the outside numbers into the inside 5X5 matrix. Each outside number counts 5 up or down or left or right depending on their positions and remove the outside boxes. Now, the 5X5 matrix using 1, 2, 3, . . ., 25 (none of the numbers are repeated) and if you add column wise or row wise or diagonal wise, the sum of the 5X5 matrix = 65.

See figures: 3.1 and 3.2

The sum of the 5X5 matrix =

$n (n^2 + 1) / 2 = 5 * (5^2 + 1) / 2 = 5 * (25 + 1)/2 = 5 * 13 = 65$

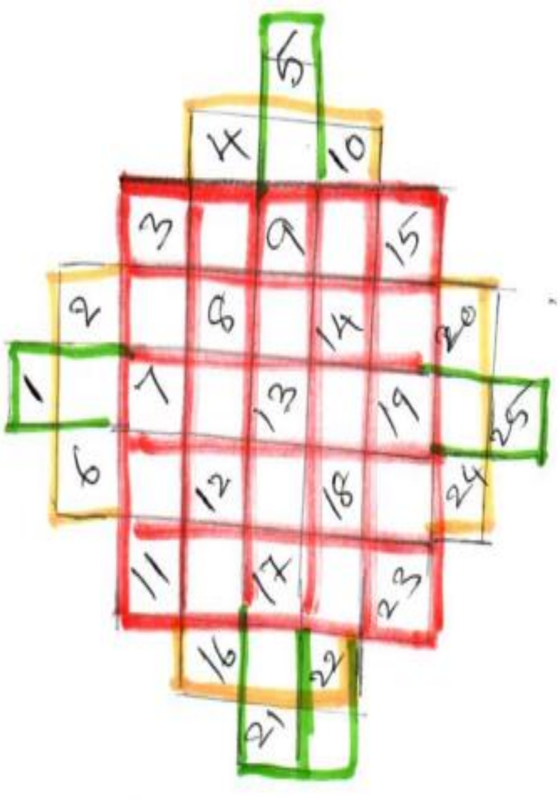

Figure 3.1

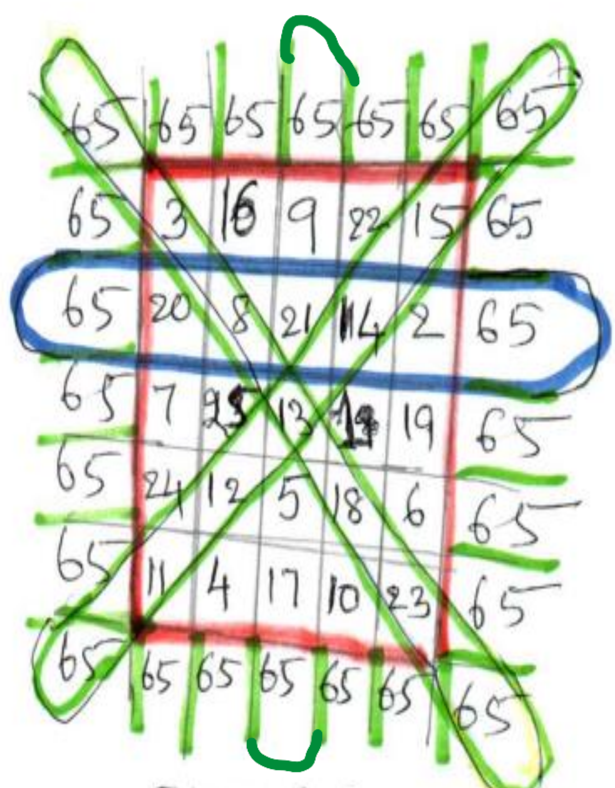

Figure 3.2

7X7 Matrix

You can also do the same way. Now, we need to bring the outside numbers into 7X7 matrix. Each outside numbers, count 7 up or down or left or right depending on their positions. The 7X7 matrix using 1, 2, 3, . . ., 49 and if you add column wise or row wise or diagonal wise, the sum will be 175. See figures: 4.1 and 4.2

The sum of the 7X7 matrix =

$n (n^2 + 1) / 2 = 7 * (7^2 + 1) / 2 = 7 * (49 + 1) / 2 = 7 * 25 = 175$

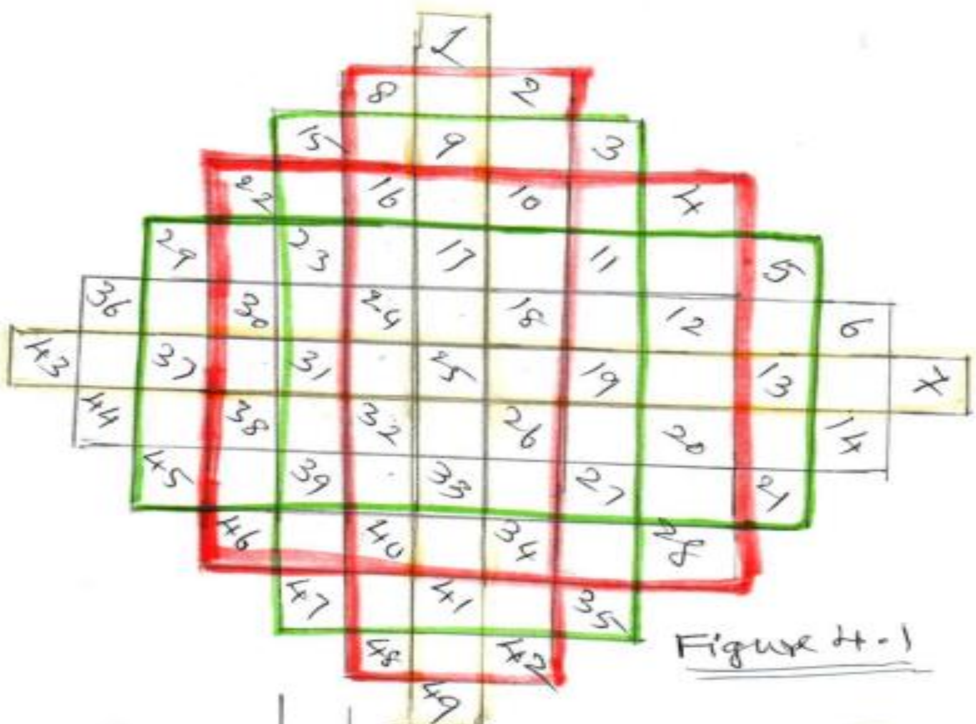

Figure 4.1

MATRIX 7X7

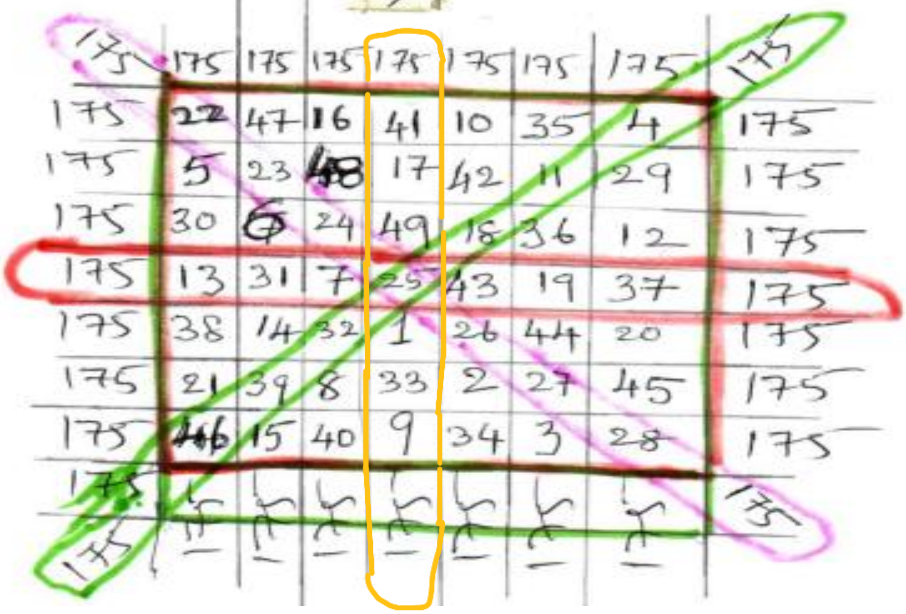

Figure 4.2

9X9 Matrix

NOTE: Only 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 16, 17, 18,19, 20, 26, 27, 28, 36, 46, 54, 55, 56, 62, 63, 64, 65, 66, 70, 71, 72, 73, 74, 75, 76, 78, 79, 80, and 81 numbers are outside of our original 9X9 matrix like the below purple 9X9 matrix.

You can also do the same way; we need to bring the outside numbers into 9X9 matrix. Each outside numbers, count 9 up or down or left or right depending on their positions. The 9X9 matrix using 1, 2, 3, . . ., 81 and if you add column wise or row wise or diagonal wise, the sum will be 369 like in figure 5.2

The sum of the 9X9 matrix =

$$n(n^2 + 1) / 2 = 9 * (9^2 + 1) / 2 = 9 * (81 + 1) / 2 = 9 * 41 = 369$$

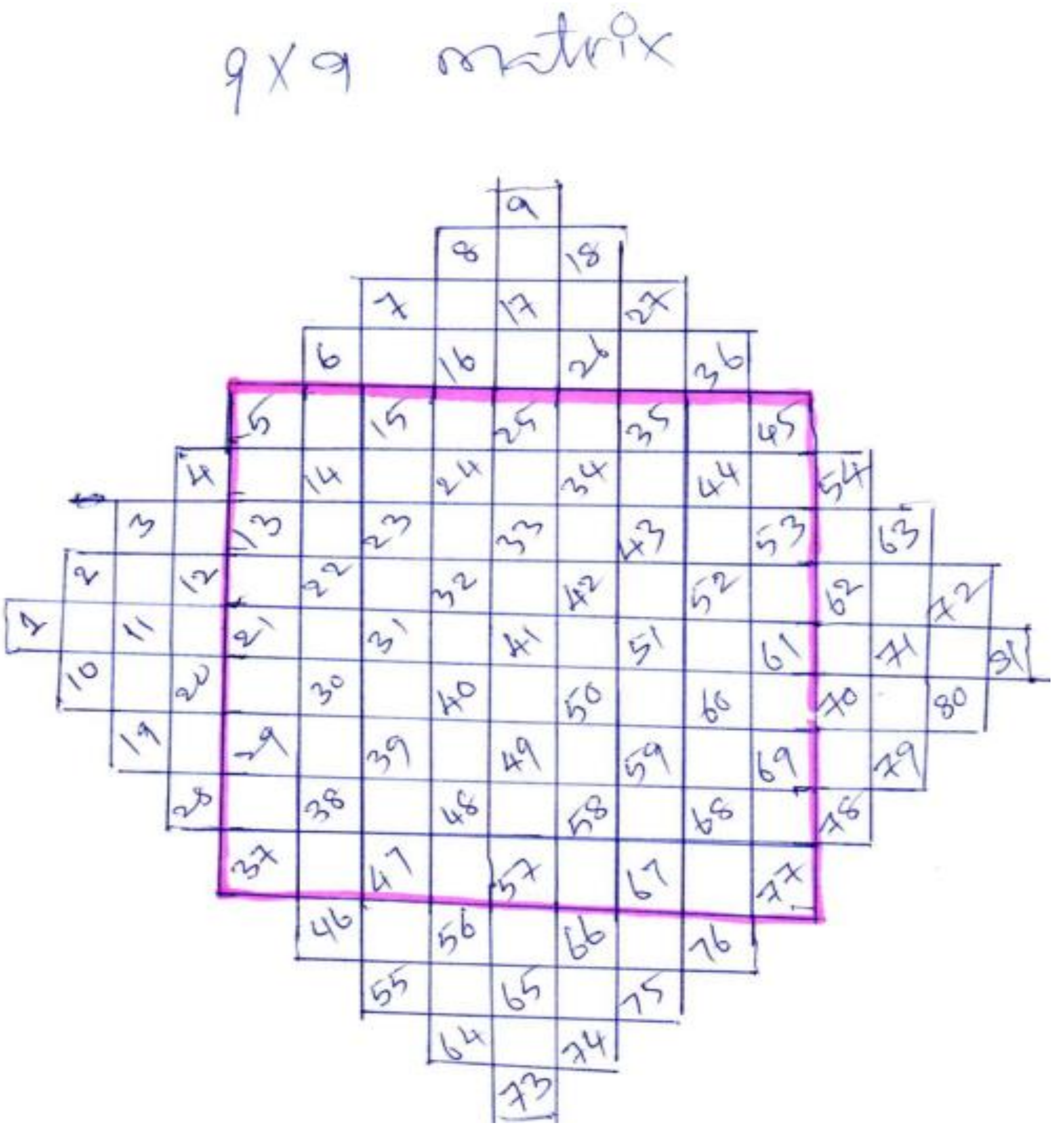

Figure: 5.1

9 X 9 Matrix

369	369	369	369	369	369	369	369	369	369	369
369	5	46	15	56	25	66	35	76	45	369
369	54	14	55	24	65	34	75	44	4	369
369	13	63	23	64	33	74	43	3	53	369
369	62	22	72	32	73	42	2	52	12	369
369	21	71	31	81	41	1	51	11	61	369
369	70	30	80	40	9	50	10	60	20	369
369	29	79	39	8	49	18	59	19	69	369
369	78	38	7	48	17	58	27	68	28	369
369	37	6	47	16	57	26	67	36	77	369
369	369	369	369	369	369	369	369	369	369	369

Figure - 5.2

He also explained regarding EVEN number of matrices like 4X4, 6X6, and 8X8, but I forgot how to do that (of course, I did not tried hard enough to find out). Please let me know if you guys can figure out the EVEN number of matrices.