

There is no magic in mathematics *

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Ref.: magicrama.tex
Ver.: 20190511b

1 Ramanujan's magic square

A square matrix can tell us so many things and even show us some “magic”. Let us take the date of birth of the legendary Srinivasa Ramanujan ¹, as an example (he was born on 22-12-1887).

DD	MM	CC	YY
22	12	18	87

Now, create a 4x4 matrix as follows:

22	12	18	87
21	84	32	02
92	16	07	24
04	27	82	26

Table 1: Ramanujan's magic square #1

Notice the following magic in the above matrix (aka magic square):

- Each row adds up to 139 (e.g. $22 + 12 + 18 + 87$)
- Each column adds up to 139 (e.g. $22 + 21 + 92 + 04$)
- All the corners add up to 139 (e.g. $22 + 87 + 04 + 26$)

*Constructive suggestions and comments are welcome. Send to : drpartha@gmail.com

¹<http://drpartha.org.in/drpartha/ramanukumbak.htm>

- All the elements of the 2x2 submatrix in the middle add up to 139 (e.g. $84 + 16 + 32 + 07$)
- All the elements of each diagonal add up to 139 (e.g. $22 + 84 + 07 + 26$)

Now, divide the 4x4 matrix into four 2x2 submatrices by drawing a vertical line in the middle and a horizontal line in the middle of the 4x4 matrix. Now, notice that

- All the elements of each 2x2 submatrix add up to 139 (e.g. $22 + 12 + 21 + 84$)

A closer look at the above 4x4 matrix will show that there is really no “magic” in the above magic square ². The above matrix is made with the following elements:

DD	MM	CC	YY
CC + 3	YY - 3	DD + 10	MM - 10
YY + 5	CC - 2	MM - 5	DD + 2
MM - 8	DD + 5	YY - 5	CC + 8

It is easy to see why the above magic observations work on this matrix.

Using the same idea as above, you can create another magic square easily. All you need to do is to choose the matrix elements accordingly. Try this:

DD	MM	CC	YY
YY+1	CC-1	MM-3	DD+3
MM-2	DD+2	YY+2	CC-2
CC+1	YY-1	DD+1	MM-1

22	12	18	87
88	17	09	25
10	24	89	16
19	86	23	11

Table 2: Ramanujan’s magic square #2

You can construct any number of “magic” squares like the above, if you follow the above logic. You can start with any set of four numbers for the

²All you need to do is to select appropriate numbers in the cells, using a simple logic.

top row, and fill the rest of the square with cleverly chosen numbers. In fact, you can build such “magic” squares for anybody’s date-of-birth (even yours).

For a remarkably detailed article on Magic Squares, see https://www.wikiwand.com/en/Magic_square

There is no magic in mathematics !

QED

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