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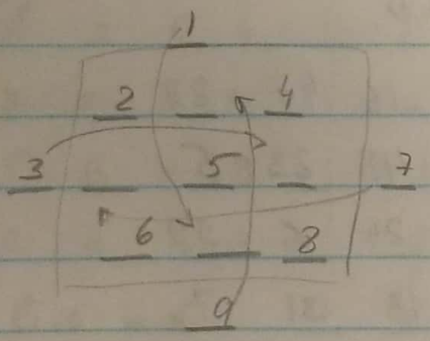
HW2

1. An $n \times n$ magic square has n rows and n columns filled with numbers $1 - n^2$. The arithmetic sum formula states that the sum of all the numbers in the matrix is $\frac{(n^2+1)n^2}{2}$.

Since there are n rows and n columns and all columns and rows have the same sum

so: $$\frac{\frac{(n^2+1)n^2}{2}}{n} = \boxed{\frac{(n^2+1)n}{2}}$$

2. 3x3 matrix, numbers 1-9



$\rightarrow$

2	9	4
7	5	3
6	1	8

3. 4x4 matrix numbers 1-16

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

start

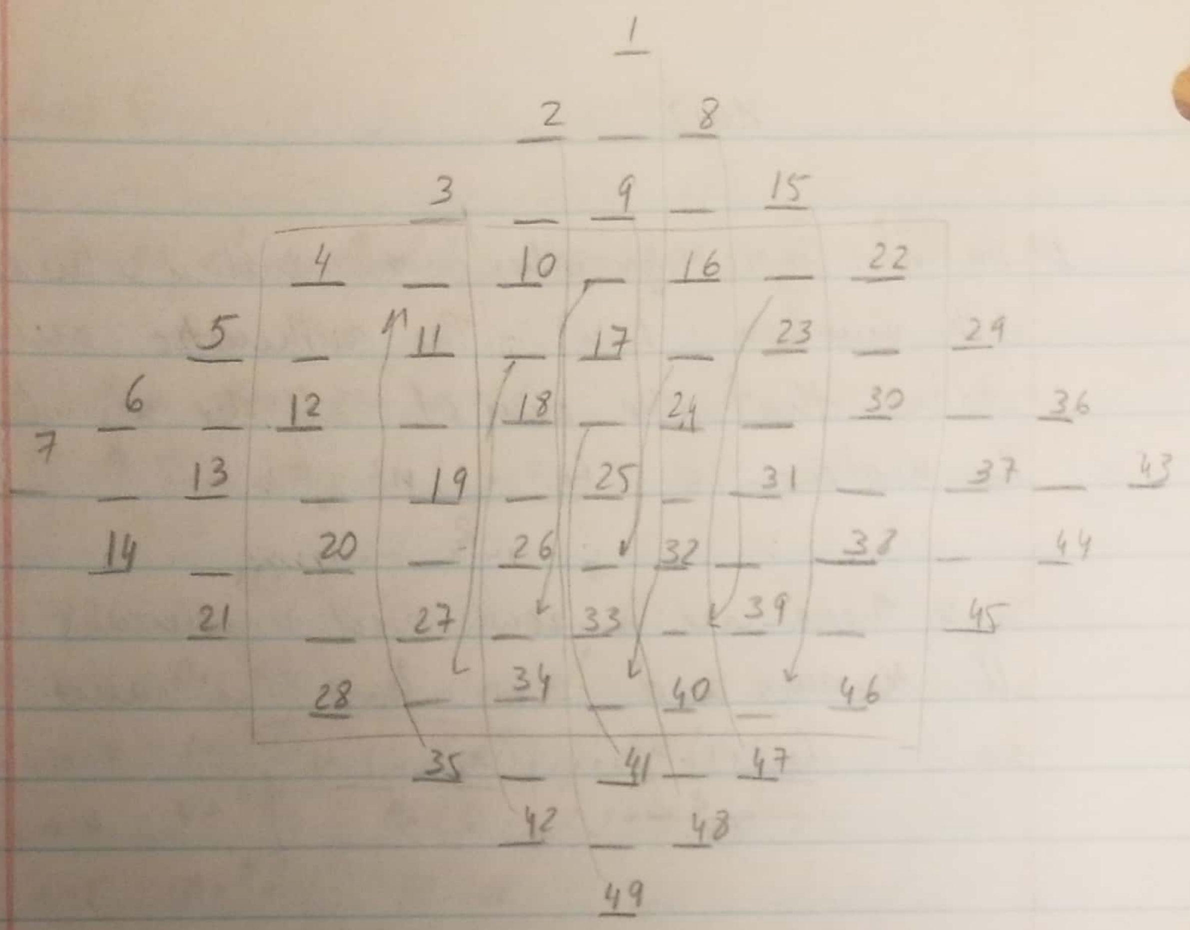
$\rightarrow$

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

2, 3, 5, 8, 9, 12, 14, 15

refill as shown by arrows

4.



↓

4	35	10	49	16	47	22
29	11	42	17	48	23	5
12	36	18	41	24	6	30
43	19	37	25	13	31	7
20	44	26	9	32	14	38
45	27	2	33	8	39	21
28	3	34	1	40	15	46

5. A: 1 3 5 7

B: 2, 4, 6

B\A	1	3	5	7
2	B	A	A	A
4	B	B	A	A
6	B	B	B	A

P(A wins) = $\frac{6}{12}$

P(B wins) = $\frac{6}{12}$

Each player is equally likely to win.

6. 2 9 4 ← deck A

7 5 3 ← deck B

6 1 8 ← deck C

A vs B

B\A	2	9	4
7	B	A	B
5	B	A	B
3	B	A	A

B is more likely to win

B vs C

C\B	7	5	3
6	B	C	C
1	B	B	B
8	C	C	C

C is more like to win

A vs C

C\A	2	9	4
6	C	A	C
1	A	A	A
8	C	A	C

A is more likely to win

Yes this does constitute a sucker's paradox because there is no one deck that is better against every other deck.