① example: assume $n=6$

$$S = 1+2+3+4+5+6$$
$$S = 6+5+4+3+2+1$$

Two ways to write sum of #1-6

now

$$S = 1+2+3 \ldots\ldots + N$$
$$S = N + (N-1) + (N-2) + \ldots\ldots 1$$

$$S+S = (1+N) + (2+N-1) + (3+N-2) + \ldots (N+1)$$
$$2S = (1+N) + (N+1) + (N+1) + \ldots\ldots (N+1)$$
$$2S = N(1+N)$$
$$\frac{2S}{2} = \frac{N(1+N)}{2}$$
$$S = \frac{N(N+1)}{2}$$

1	2	3	......	N
N	n-1	n-2	......	1
n+1	n+1	n+1	......	n+1

$$\frac{2S}{2} = n(n+1)$$
$$S = \frac{n(n+1)}{2}$$

② Let's assume that there are 3 letters available: each time we want to select a pair of two letters out of the 3. Here is one way to write this;

A, B, C

("A", "B") ("A", "C")

A, B, C

("B", "A") ("B", "C")

A, B, C

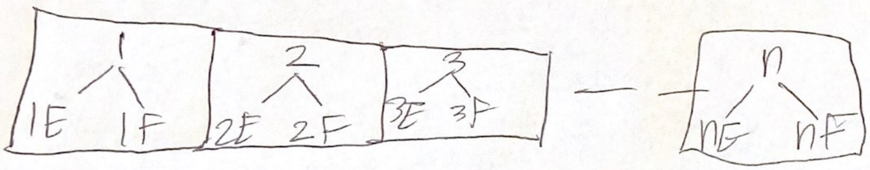
("C", "A") ("C", "B")

There are 6 ways to write it and if order of letters is not important, then there are 3 ways to write it.

$$\#\text{ of ways} = \frac{3(3-1)}{2} = 3$$

$$\text{If } N \text{ letters are available} = \frac{N(n-1)}{2}$$

There are n numbers and A letters (values) available. Let's assume A=2. There are 2 letters of E & F. We assign each numbers from 1 to n to two letters of E & F.



First Box (2 ways) 1E, 1F 2^1
First + second (1E, 1f, 2E, 2f $2^1 \cdot 2^1 = 2^2$
First, second, third $2^1 \cdot 2^1 \cdot 2^1 = 2^3$

There are 2^n ways to write one numbers from 1 to n and 2 letters.
If there are n numbers and A letters than n for n boxes $= A^n$