

DOUBLE COUNTING

Pascal's Identity \rightarrow

$${}^nC_k = {}^{n-1}C_{k-1} + {}^{n-1}C_k$$

no. of groups where a particular element will be present \leftarrow Include

Exclude
no. of groups where a given element will not be present.

Let's use the include-exclude double counting to generate 2^n (power set).

$$(1+1)^n = {}^nC_0 + {}^nC_1 + {}^nC_2 + \dots + {}^nC_n$$

no. of groups considering 0 element

no. of groups considering 2 element

Let's take the example of 'abc' to generate power set.

$$\{abc\} = \{\{\}, \{a\}, \{b\}, \{c\}, \{a,b\}, \{a,c\}, \{b,c\}, \{a,b,c\}\}$$

$$= 2^3 = 8$$

Output $\rightarrow \{\}$ abc \leftarrow Input

