Problem C. Binomial Powers

Source file name:	C.c, C.cpp, C.java, C.py
Input:	Standard
Output:	Standard

In algebra, one of the classical examples of algebraic expansions is the binomial power $(x + y)^n$, where $n \geq 0$ is an integer.

Here are a couple examples of these expansions:

$(x + y)^2 = x^2 + 2xy + y^2$

$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$

As you can see, the number of terms in the expansion is always $n + 1$ and the exponents on x decrease from n to 0 while the exponents on y increase from 0 to n along these terms.

The only thing that is not so obvious is the values of each term's coefficient. An interesting result from algebra is that coefficients are very easy to calculate.

If you sort the terms in the ordering described above (x exponents decreasing), the value of the k-th term's coefficient is $_nC_k$, which is usually called "n choose k" and is defined as follows:

$_nC_k = \frac{n!}{(k!(n-k)!)}$

Fortunately, a recursive definition exists for the binomial coefficients and is calculated as follows:

For $n, k > 0$; $_nC_k = {}_{(n-1)}C_{(k-1)} + {}_{(n-1)}C_k$

For $n \geq 0$; $_nC_0 = 1$; $_nC_n = 1$

Your job here is to expand a bunch of binomial powers as explained.

Input

The input starts with a line with a single integer T, followed by T test cases. Each test case is written in a single line and contains a single integer n.

- $1 \leq T \leq 100$

- $0 \leq n \leq 100$

Output

For each test case you need to calculate the expansion of $(x + y)$.

The output must be written as in the sample output, with exponents written after a '^' symbol and no spaces between any characters. Terms must be separated by a '+' character. Also remember that the terms must be sorted as explained before.

If a variable in a term has exponent 1, you must not write the exponent nor the '^' symbol. If the exponent is 0 you must also not write the variable itself. Coefficient should only be written if it is different from 1, or if both variables have exponents 0.

Examples:

- $3x^2y^0$ should be printed as 3x^2

- $1x^3y^1$ should be printed as x^3y

- $2x^0y^2$ should be printed as 2y^2

- $1x^0y^0$ should be printed as 1

Example

Input	Output
2	x^2+2xy+y^2
2	x^3+3x^2y+3xy^2+y^3
3	