Problem C. Tautology

Time limit   1000 ms

Mem limit   1048576 kB

OS   Linux

WFF 'N PROOF is a logic game played with dice. Each die has six faces representing some subset of the possible symbols K, A, N, C, E, p, q, r, s, t. A Well-formed formula (WFF) is any string of these symbols obeying the following rules:

- p, q, r, s, and t are WFFs

- if *w* is a WFF, N*w* is a WFF

- if *w* and *x* are WFFs, K*wx*, A*wx*, C*wx*, and E*wx* are WFFs.

The meaning of a WFF is defined as follows:

- p, q, r, s, and t are logical variables that may take on the value 0 (false) or 1 (true).

- K, A, N, C, E mean *and*, *or*, *not*, *implies*, and *equals* as defined in the truth table below.

Definitions of K, A, N, C, and E						
w	*x*	K*wx*	A*wx*	N*w*	C*wx*	E*wx*
1	1	1	1	0	1	1
1	0	0	1	0	0	0
0	1	0	1	1	1	0
0	0	0	0	1	1	1

A *tautology* is a WFF that has value 1 (true) regardless of the values of its variables. For example, ApNp is a tautology because it is true regardless of the value of p. On the other hand, ApNq is not, because it has the value 0 for $p = 0$, $q = 1$.

You must determine whether or not a WFF is a tautology.

Input

Input consists of several test cases. Each test case is a single line containing a WFF with no more than 100 symbols. A line containing 0 follows the last case.

Output

For each test case, output a line containing "`tautology`" or "`not`" as appropriate.

Sample 1

Input	Output
ApNp ApNq 0	tautology not