

CP #57: Tautology

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, Nw is a WFF
- if w and x are WFFs, Kwx, Awx, Cwx, and Ewx 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	Kwx	Awx	Nw	Cwx	Ewx
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 Format

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 Format

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

Sample Input 0

ApNp
ApNq
0

Sample Output 0

tautology
not