

Problem D: 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 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. For each test case, output a line containing *tautology* or *not* as appropriate.

Sample Input

```
ApNp
ApNq
0
```

Possible Output for Sample Input

```
tautology
not
```

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