Task: POS
The search

XVI OI, Stage III, Day two. Source file `pos.*` Available memory: 32 MB. *02.04.2009*

Young Bytie and Byteen are in deep trouble. The evil sorcerer Bitter, knowing they are head over heels in love, kidnapped Byteen for ransom. What Bitter did not know is that while Bytie is determined to bring Byteen back, he is not well off and thus cannot afford the ransom. Having little options, Bytie challenged Bitter for Byteen's return. Bitter despises all fights, but burning ambition made him propose the following solution. If the boy guesses on which floor the girl is imprisoned, the sorcerer will let her free.

There are many floors in the sorcerer's tower — they are numbered from 1 to n. Bytie can only get some information by asking Bitter questions of the form "Is Byteen above/below the floor no. x?" Of course, Bytie can choose the number x arbitrarily, as well as either of the words "above" or "below". Bitter promises to answer such queries truthfully, but asks for reward. The sorcerer charges a bythalers for every question with the answer "yes" and b bythalers for every question with the answer "no". He also refuses to answer questions of any other form than the one mentioned. The trouble is that Byteen is a material girl, who may decide to stay with the evil sorcerer, should he make enough profit out of Bytie's misery...

Bytie wonders what questions he should ask. Unfortunately, Byteen hears the whole conversation, i.e. successive Bytie's questions and the answers that Bitter provides. If Bytie spends just one bythaler more than it is (in the worst case) absolutely necessary to deduce her position, she will feel gravely offended and will stay with Bitter. Precisely, if at any point during the conversation it is possible to deduce that from then on, irrespective of Bitter's answers, Bytie can guess Byteen's location by spending no more than K bythalers, but from that point the boy spends more than K bythalers, then Byteen will decide to stay with Bitter. Poor Bytie would never get over such failure. Aid him in passing the test!

Communication

You are to implement a programme that solves Bytie's problem using a supplied library (that simulates the evil sorcerer Bitter). To use it, one has to type in ones programme:

- C/C++: `#include "poslib.h"`
- Pascal: `uses poslib;`

The library supplies three procedures and/or functions:

- `inicjuj` (*init* in Polish) — returns the number of floors n and the costs a and b. It should be called once, at the very beginning of the programme's execution.
  - C/C++: `void inicjuj(int *n, int *a, int *b);`
  - Pascal: `procedure inicjuj(var n, a, b: longint);`
- `pytaj` (*ask* in Polish) — character c denotes the type of question ('`W`' for above or '`N`' for below), while x is the floor number. Returns the boolean answer to the query. Your programme may call this function arbitrarily many times.
  - C/C++: `int pytaj(char c, int x);` (0 denotes false, and 1 truth),
  - Pascal: `function pytaj(c: char; x: longint): boolean;`
- `odpowiedz` (*answer* in Polish) — with this procedure/function you should declare on which floor Byteen is. It should be called exactly once. The call will terminate your programme's execution.
  - C/C++: `void odpowiedz(int wynik);`
  - Pascal: `procedure odpowiedz(wynik: longint);`

Your programme cannot open any files nor use standard input and output. The programme is going to be compiled together with the library by the following commands:

- C: `gcc -O2 -static poslib.c pos.c -lm`
- C++: `g++ -O2 -static poslib.c pos.cpp -lm`
- Pascal: `ppc386 -O2 -XS -Xt pos.pas`

In the subdirectory `/home/zawodnik/rozw/lib` you can find exemplary libraries as well as non-optimal solutions presenting their usage. The library files should be in the current directory in order for the compilation commands to work.

Limits

You can assume that $1 \leqslant n \leqslant 10^9$ and $1 \leqslant a, b \leqslant 10\,000$.

Exemplary execution of a programme

Function call	**Values returned and explanation**
Pascal: `inicjuj(n,a,b);` C lub C++: `inicjuj(&n,&a,&b);`	From now on $n = 5$, $a = 1$, $b = 2$.
`pytaj('W',3);`	The answer is 0/`false`. You ask if Byteen is above the third floor. You receive the answer "no". You pay 2 bythalers.
`pytaj('N',2);`	The answer is 0/`false`. You ask if Byteen is below the second floor. You receive the answer "no", for which you pay 2 more bythalers.
`pytaj('W',2);`	The answer is 1/`true`. You ask if Byteen is above the second floor. You receive the answer "yes", for which you pay 1 bythaler.
`odpowiedz(3);`	You guess that Byteen is on the third floor. Your guess is correct. You spend 5 bythalers in total.

Above interaction is correct, but not optimal. Hence the programme would not receive any points for this test. In particular, for $n = 5$, $a = 1$, $b = 2$ a well written programme can ask questions in such a way that it never pays more than 4 bythalers.