Problem G
Counterfeit Coins

Input File: G.DAT
Program Source File: G.PAS or G.C or G.CPP

The "Great Expectations" Popular Bank is verifying the deposits it holds. A deposit is a pile of coins of equal weight. The secret service came with the information that *precisely one coin from each deposit has been replaced with a counterfeit coin*, which is lighter or heavier than any other coin in the deposit. Take for granted this information and write a program that verifies the deposits. For each deposit and the outcome of a series of weighting tests the program tries to find the bad coin and its relative weight. The program input is from a text file. Each data set in the file stands for a deposit and has the format:

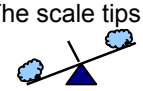
$$\texttt{N M weighting\_test}_1 \ldots \texttt{weighting\_test}_M$$

$3 \le N \le 1000$ is the number of coins in the deposit, and $M \ge 0$ is the number of weighting tests. The coins are identified by numbers from 1 to N. A `weighting_test` has the format:

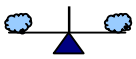
$$\texttt{coin}_1 \ldots \texttt{coin}_{w/2}\ \texttt{needle}\ \texttt{coin}_{w/2+1} \ldots \texttt{coin}_w$$

where $w > 0$ is the even number of weighted coins $1 \le \texttt{coin}_k \le N$, $k=1,w$, $\texttt{coin}_i \ne \texttt{coin}_j$ for $i \ne j$. Coins $\texttt{coin}_1 \ldots \texttt{coin}_{w/2}$ are placed on the left pan of the scale; coins $\texttt{coin}_{w/2+1} \ldots \texttt{coin}_w$ are placed on the right pan of the scale. The `needle` is one of the characters \,|,/ as follows:

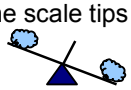
\ The scale tips left.



| The scale is in balance.



/ The scale tips right.



Data items in the input are separated by at least one white space. The input data comply fully with the format above but may be logically inconsistent or incomplete *with regard to the problem assumption*. The result for each deposit is printed on standard output as shown below.

Result	Meaning
`Coin # is light`	The coin numbered # is counterfeit and it is light.
`Coin # is heavy`	The coin numbered # is counterfeit and it is heavy.
`Inconsistent data`	The assumption is contradicted or conflicting conclusions on the kind of coins (honest or bad) follow from data and problem's assumption.
`Incomplete data`	Data do not provide sufficient information to find the counterfeit coin and its relative weight.

The examples below span some possible cases of correct, inconsistent or incomplete input data. The first data set is for 3 coins and 2 weighting tests. The test `1 | 2` weights coins 1 and 2. Since the scale is in balance both coins are honest. The test `1 \ 3` weights coins 1 and 3. The scale tips left and, therefore, coin 3 is light. The second data set (3 coins, 2 tests) contradicts the problem assumption since all coins are honest.

Input	Output
`3 2  1 | 2  1 \ 3`	`Coin 3 is light`
`3 2  1 | 2  1 | 3`	`Inconsistent data`
`3 2  1 | 2  1 \ 2`	`Inconsistent data`
`3 1  1 | 2`	`Incomplete data`
`4 2  1 | 2  1 2 \ 3 4`	`Incomplete data`

In the third data set the weighting tests lead to contradictory conclusions: a) both 1 and 2 are honest, and b) one of 1 and 2 is counterfeit. In the fourth data set (3 coins, 1 weighting test) coin 3 is counterfeit but we do not know whether it is light or heavy. In the last data set one coin out of 3 and 4 is light but we cannot tell which.