**Math Homework**

You have  a math homework on fractions, but you  don't want to repeatedly calculate for every question. You plan to develop a program to ease your work. Your work is to find whether a fraction is proper , if it is improper then convert it into a whole number or a mixed fraction.  
Write a program to find whether a fraction is proper , if it is improper then convert it into a whole number or a mixed fraction.  
Proper fraction is a fraction in which the numerator is  less than the denominator.  
  
**Input format :**  
First line of the input contains a single integer that denotes the numerator.  
Second line of the input contains a single integer that denotes the denominator.  
  
**Output format:**  
If proper  
print Proper  
If Improper and can be reduced to a whole number  
print - the whole number  
If Improper and cannot be reduced convert it into a mixed fraction  
print - Whole Number part Numerator / Denominator  
  
  
**Sample input 1:**  
10  
20  
**Sample output 1:**  
Proper      
  
**Sample input 2:**  
5  
4  
**Sample output 2:**  
1 1/4  
  
**Sample input 3:**  
8  
4  
**Sample output 3:**  
2

**Math is fun**

Consider the following template for an equation:  
a ? b ? c ? d  
Here each letter stands for an integer value, and ? stands for either an equals sign(=) or a multiplication operator(\*).  
You have the values of four integers.  
Write a program to check if you can fill the ? with two multiplication operators, and one equals sign, such that the resulting equation will be correct?  
The integers are to be maintained in the given order .  
  
**Input format :**  
First line of the input contains a single integer that denotes the first number.  
Second line of the input contains a single integer that denotes the second number.  
Third line of the input contains a single integer that denotes the third number.  
Fourth line of the input contains a single integer that denotes the fourth number.  
  
**Output format:**  
If it is possible, print "True" and print the correct expression.  
If it is not possible, print "False".  
  
**Sample input 1:**  
2  
6  
3  
4  
  
**Sample output 1:**  
True      
2\*6=3\*4  
  
**Explanation:**  
 For values = 2 , 6, 3 , 4  the output should be True.  
Here is how the template can be filled to result in a correct equation: 2 \* 6 = 3 \* 4.  
  
**Sample input 2:**  
2  
3  
5  
5  
**Sample output 2:**  
False

**Sandeep's house**

Sandeep is lost into a dreamland of Math fantasy. Here every house has a height in the order of the Fibonacci sequence. Find the first position of the house( 0 based ) with height exactly n digits.  
Help Sandeep to find his house by writing a program.  
  
Consider the Fibonacci sequence: 0 1 1 2 3 5 8 13 21 ...  
  
**Input format:**  
First line contains a single integer that denotes n.  
  
**Output format:**  
Output is an integer that denotes index of Sandeep's house.  
  
**Sample input 1:**  
2  
**Sample output 1:**  
7  
**Explanation**:  
Here the n value is 2, which means we need to find the index of the first fibonacci number that has 2 digits.  
Such number is 13. 13 is at index 7 (0 based) in the sequence 0 1 1 2 3 5 8 13 21....  
  
**Sample input 2:**  
3  
**Sample output 2:**  
12

**Water Tank**

There are  n water tanks with small defects causing water to leak. You need to know which tank empties first, so you can take the necessary precautions.  
You're given two arrays of the length n.  
First array denotes the amount of water in each tank  
Second array denotes the flow rate of the leakage from each tank, respectively.  
  
Write a program to determine which tank will empty first. The index of the tank starts from 0.  
If more than one tanks empty at the same time, print all the indices comma separated in ascending order.  
  
**Input format:**  
First line contains a single integer denotes the number of tanks.  
Second line contains of space separated integer values of the First array.  
Third line contains of space separated integer values of the Second array.  
  
**Output format:**  
A single integer output that denotes the 0 based index.  
  
**Sample Input 1:**  
3  
1 4 2  
1 2 1  
**Sample Output 1:**  
0  
  
**Sample Input 2:**  
2  
100 50  
100 50  
**Sample Output 2:**  
0,1

**Locker**

You have found a locker and a note that has the key to open the locker.  
The note has a series of numbers and it says to find the magic shift to unlock the locker.   
  
The Magic Element Shift is the difference between the element's value and its index.  
The Magic Shift is the difference between the maximal and the minimal Magic Element Shifts among all of the array elements.  
Given n integers, write a program to find its Magic Shift to help you open the locker.  
  
**Input format:**  
First line contains a single integer denotes the size of the array.  
Second line contains of space separated integer values of the First array.  
  
**Output format:**  
Output is an integer that denotes the magic shift.  
  
**Sample Input 1:**  
4  
1 0 2 3  
**Sample Output 1:**  
2  
  
**Explanation:**  
For example, for magic [1, 0, 2, 3] of array [0, 1, 2, 3] shifts for the respective elements are [1, -1, 0, 0].  
Shift array is the difference betweeen each element and its index.  
[ 1-0 , 0-1 , 2-2 , 3-3 ] = [ 1  , -1 , 0 , 0 ]  
Maximum shift = 1  
Minimum shiift = -1  
magic shift of [1,0,2,3] is 1 - (-1) = 2.  
  
**Sample Input 2:**  
5  
2 2 4 1 0  
**Sample Output 2:**  
6

**Paint using Matrix**

You are implementing a command-line version of the Paint app. Since the command line doesn't support colors, you are using different characters to represent pixels. Your current goal is to support rectangle x1 y1 x2 y2 operation, which draws a rectangle that has an upper left corner at (x1, y1) and a lower right corner at (x2, y2). Here the x-axis points from left to right, and the y-axis points from top to bottom.  
  
Given the canvas size and the coordinates of the two corners,  
write a program to print the canvas state after the operation is applied. For the details about how rectangles are painted, see the sample.  
Fill the canvas with '~' (tilde) character.  
**Note:** The horizontal sides of the rectangle are depicted as  -s  and  the vertical sides of the rectangle are depicted as |s, asterisks (\*) stand for its corners and all of the other "pixels" remain the same.  
  
**Input format:**  
The first line contains a single integer denotes the row size of the matrix,  
The second line contains a single integer denotes the column size of the matrix,  
The next line contains two space separated integers that denotes coordinates of the upper left corner  
The last line contains two space separated integers that denotes the lower right corner  
  
**Assume:**All inputs are valid.  
  
**Output format:**  
Each line deontes the new matrix's rows,with each line containing space separated characters of the new matrix.  
  
**Sample input 1:**  
5  
8  
1 1  
4 3            
**Sample output 1:**  
~ ~ ~ ~ ~ ~ ~ ~  
~ \* - - \* ~ ~ ~  
~ | ~ ~ | ~ ~ ~  
~ \* - - \* ~ ~ ~  
~ ~ ~ ~ ~ ~ ~ ~