# Problem 78: Are Eucliding Me?

Difficulty: Medium

Originally Published: Code Quest 2018

Problem Background

Coprime integers are used as values in some cryptographic algorithms such as RSA. Two integers are coprime if their greatest common divisor (GCD) is 1. There are many ways to calculate the GCD of two numbers. The Greek mathematician Euclid developed an algorithm, known today as the Euclidean algorithm or Euclid's algorithm, to calculate the GCD of two integers.
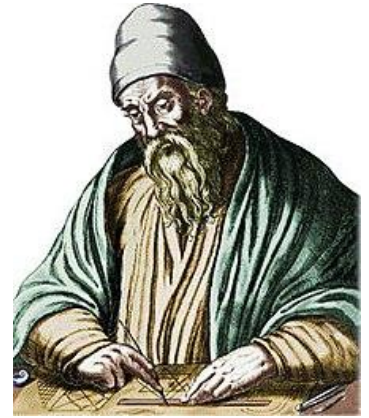
Problem Description

There are many ways to implement this algorithm, and one way is using successive subtraction like this:

When you have a subtraction problem in the form A – B = C, the letter A is called the minuend, the letter B is called the subtrahend, and the letter C is called the difference. The following is a summary of each iteration of the algorithm:

1. Always put the bigger number as the minuend and the smaller number as the subtrahend. If they are equal, then their value is the GCD. If they are both 1, the numbers are coprime.
2. Subtract to obtain the difference between the two.
3. Use the subtrahend and the difference as the two numbers in the next iteration.

The following example shows how to get the GCD of 10 and 17:

Minuend	Subtrahend	Difference	Equation
17	10	7	17 – 10 = 7
10	7	3	10 – 7 = 3
7	3	4	7 – 3 = 4
4	3	1	4 – 3 = 1
3	1	2	3 – 1 = 2
2	1	1	2 – 1 = 1
1	1	0	1 – 1 = 0

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include:

- Two integers separated by a single comma. Both numbers will be greater than or equal to 2, and less than or equal to 1,000,000.

```
2
10,17
56,26
```

Sample Output

Your program should output the following:

- For each iteration of Euclid's algorithm, print out the subtraction equation that results. Your last equation should have a difference of 0.
- At the end of each test case, indicate if the numbers are coprime or not by printing either COPRIME or NOT COPRIME.

```
17-10=7
10-7=3
7-3=4
4-3=1
3-1=2
2-1=1
1-1=0
COPRIME
56-26=30
30-26=4
26-4=22
22-4=18
18-4=14
14-4=10
10-4=6
6-4=2
4-2=2
2-2=0
NOT COPRIME
```