

Lab 3 Solutions

Groups 1-8

Weird Progression

Given x and n , find the value of

$$x + \frac{x^2}{2} + \frac{x^3}{3} + \dots + \frac{x^n}{n}$$

Print the integer value of the final value of the above expression.

Input Format

The first line contains the value of x

The second line contains the value of n

Constraints

$$0 < x, n \leq 100$$

Output Format

A single line containing the answer

Sample Input 0

```
6  
4
```

Sample Output 0

```
420
```

Explanation 0

Here, $x = 6$ and $n = 4$

$$x + \frac{x^2}{2} + \frac{x^3}{3} + \dots + \frac{x^n}{n} = 6 + \frac{6^2}{2} + \frac{6^3}{3} + \frac{6^4}{4} = 6 + 18 + 72 + 324 = 420$$

Solution:

```
x = int(input())  
n = int(input())  
ans = 0  
for i in range(1,n+1):
```

```
    ans += (x**i)/i
ans = int(ans)
print(ans)
```

One Last Game

Pooooji is playing a game and fighting against a monster. The monster attacks n times. Each time the monster attacks, the damage is different. The monster dies after all the attacks. Pooooji's character initially has health h . The first two lines will input h and n respectively. And the following n lines, will input the damage value. We say that the character survived iff it's final health is greater than *zero*. You need to print if his character will survive by printing **True**, and printing **False** otherwise.

Input Format

The first line contains h

The second line contains n

Following n lines contain the damage the monster does on each attack

Constraints

$$1 \leq h \leq 1000$$

$$1 \leq n \leq 100$$

$$1 \leq \text{total damage} \leq 1000$$

Output Format

Print **True** if the character survives, and print **False** otherwise.

Sample Input 0

```
500
4
30
400
10
15
```

Sample Output 0

```
True
```

Explanation 0

Here, $h = 500$ and $n = 4$

First attack that the monster did causes 30 damage, so current health is $500 - 30 = 470$

Second attack that the monster did causes 400 damage, so current health is $470 - 400 = 70$

Third attack that the monster did causes 400 damage, so current health is $70 - 10 = 60$

Fourth attack that the monster did causes 400 damage, so current health is $60 - 15 = 45$

As the current health is greater than *zero* which means that the character survived so we print **True**

Solution:

```
h = int(input())
n = int(input())
```

```
for i in range(n):
    damage = int(input())
    h = h - damage
if(h>0):
    print(True)
else:
    print(False)
```

I've got the power

Ashmit needs chocolates from Shivangi. But, Shivangi will only give him the chocolates if Ashmit is able to solve a problem that Shivangi asks him. The problem goes as follows -

Given two numbers a and b .

We know that, $a^n = b$, for some integer n .

Ashmit needs to find n , but isn't able to and comes to you for your help.

Compute and print n .

NOTE: You are not allowed to use any libraries including math.

Hint: Read the constraints for n carefully.

Input Format

The first line contains the integer a

The second line contains the integer b

Constraints

$$1 \leq n \leq 25$$

$$2 \leq a \leq 1000$$

$$2 \leq b \leq 2^{25}$$

Output Format

Print the value of n that satisfies $a^n = b$

Sample Input 0

```
2
8
```

Sample Output 0

```
3
```

Explanation 0

Here, $a = 2$ and $b = 8$

As, $2^3 = 8$, therefore, $n = 3$

So, we print 3

Solution:

```
a = int(input())
b = int(input())
for i in range(1, 26):
    if(a**i == b):
        print(i)
```

```
break
```

Next Perfect Squares

You're given a positive integer "n". Input another integer "k" and find the next "k" perfect squares from "n" (excluding n).

Input Format

1st line contains input for "n"

2nd line contains input for "k"

Constraints

$1 \leq n \leq 200$

$1 \leq k \leq 20$

Output Format

Print "k" perfect squares all line separated

Sample Input 0

```
2
5
```

Sample Output 0

```
4
9
16
25
36
```

Explanation 0

Next 'k' (5) perfect squares after 2 are $4 (2^2)$, $9 (3^2)$, $16 (4^2)$, $25 (5^2)$ and $36 (6^2)$

Solution:

```
n = int(input())
k = int(input())
cnt = 0
while(cnt < k):
```

```
n = n + 1
i = n**0.5
i = int(i)
if(i*i == n):
    print(n)
    cnt+=1
```

How many in between?

Given T , the total number of test cases. For each test case you are given four numbers a, b, c, d . You need to check how many numbers between a and b (inclusive) are divisible by c but not divisible by d .

Input Format

The first line contains the number of testcases T

For each test case,

The first line contains a

The secrnd line contains b

The third line contains c

The fourth line contains d

Constraints

$0 < T \leq 100$

$0 < a, b, c, d \leq 10^5$

Output Format

For each test case,

Print the numbers between a and b (inclusive) which are divisible by c but not divisible by d .

Sample Input 0

```
2
1
15
3
5
12
50
7
5
```

Sample Output 0

```
4
5
```

Explanation 0

$T = 2$ from first line so there are two test cases

For the first test case,

$a = 1, b = 15, c = 3, d = 5$

So, the numbers between 1 and 15 that are divisible by 3 and not divisible by 5 are 3, 6, 9, 12 so there are a total of 4 numbers so we print 4.

For the second test case,

$a = 12, b = 50, c = 7, d = 5$

So, the numbers between 12 and 50 that are divisible by 7 and not divisible by 5 are 14, 21, 28, 42, 49 so there are a total of 5 numbers so we print 5.

Solution:

```
T = int(input())
for i in range(T):
    a = int(input())
    b = int(input())
    c = int(input())
    d = int(input())
    ans = 0
    for j in range(a, b+1):
        if(j%c==0 and j%d!=0):
            ans += 1
    print(ans)
```

Practice Questions

FizzBuzz

Given a number N . Iterate from 1 to N and print according to the following rules:

1. For multiples of three, print "Fizz" instead of the number.
2. For multiples of five, print "Buzz".
3. For numbers which are multiples of both three and five, print "FizzBuzz".
4. If none of the rules above apply, print the number

Input Format

The first and only line contains a single integer N

Constraints

$$0 < N \leq 100$$

Output Format

The program should output N lines.

Each line should be either an integer, or "Fizz" or "Buzz" or "FizzBuzz" according to the rules.

Sample Input 0

5

Sample Output 0

```
1  
2  
Fizz  
4  
Buzz
```

Sample Input 1

```
16
```

Sample Output 1

```
1  
2  
Fizz  
4  
Buzz  
Fizz  
7  
8  
Fizz  
Buzz  
11  
Fizz  
13  
14  
FizzBuzz  
16
```

Solution:

```
N = int(input())  
for i in range(1,N+1):  
    if i%3 == 0:  
        if i%5 == 0:  
            print("FizzBuzz")  
        else:  
            print("Fizz")  
    elif i%5 == 0:  
        print("Buzz")  
    else:  
        print(i)
```

Ramanujan Numbers 1

Ramanujan Numbers are the numbers that can be expressed as the sum of two cubes in two different ways.

For example, 1729 is a Ramanujan number which can be expressed as $12^3 + 1^3$ and $10^3 + 9^3$.

Your task is to determine if a given number N is a Ramanujan number. If N is a Ramanujan number then print True. Otherwise, print False

Input Format

Input contains an Integer "N"

Constraints

$0 < N \leq 10000000$

Output Format

Output returns a boolean value, True if it's a Ramanujan number, else False

Sample Input 0

```
1729
```

Sample Output 0

```
True
```

Explanation 0

$$1729 = 12^3 + 1^3 = 10^3 + 9^3$$

Solution:

```
N = int(input())
cnt = 0
for i in range(1, int(N**(1/3))+1):
    for j in range(i+1, int(N**(1/3))+1):
        if((i**3) + (j**3) == N):
            cnt+=1
        if(cnt==2):
            break
if(cnt==2):
```

```
        break
if(cnt==2):
    print(True)
else:
    print(False)
```