

1. Numerical Derivative

Problem Description

The derivative of a function is a value that tells us how much the output of a mathematical function would change, if we were to make a very, very tiny change in its input. In mathematical terms, the limit definition of a derivative is defined as: $\lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$; Where x and h are both inputs to the function f . **You can safely ignore the lim part in the expression.**

Given the values of x and h your task is to evaluate the expression $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = 3x^2 + 2$ and print the value obtained.

Input Format

The input will contain two numbers.
The first line will be the x value.
The second line will be the h value.

Output Format

The output would be a single line float value of the expression in problem description.

Sample Input

1
1

Sample Output

9.0

Note: The value of h will always be more than 0 for this problem.

2. Is the third one greater

Problem Description

Given three integer values as input, your task is to print True if the third number is greater than the first two else False.

Input Format

Input will contain three lines denoting three integer values.

Output Format

The output would be True if the condition holds else False.

Sample Input

```
1
2
3
```

Sample Output

```
True
```

Explanation

Here 3 is greater than 1 and 3 is also greater than 2 and hence the output is True.

3. Floors and Ceilings

Problem Description

The **floor function** $\text{floor}(x)$ is defined as the greatest integer less than or equal to the given number.

For example, $\text{floor}(7.64) = 7$.

Likewise, the **ceiling function** $\text{ceil}(x)$ is defined as the smallest integer greater than or equal to the given number.

For example, $\text{ceil}(7.64) = 8$.

Given a number x as input, output its $\text{floor}(x)$ and $\text{ceil}(x)$ values.

Note: **Assume that the input will never be an integer.**

Input Format

One line float value

Output Format

Print two integers, first one denoting the floor value and second one the ceiling value of the given number.

Sample Input

7.64

Sample Output

7
8

Sample Explanation

The greatest integer that is less than or equal to 7.64 is clearly 7.
The smallest integer that is greater than or equal to 7.64 is clearly 8.

4. Multiply Chain

Problem Description

Given a number n as input, multiply it with the number $(n-1)$ and $(n-2)$ and print the resultant output.

Input Format

A single line containing an integer.

Output Format

A single line output according to the problem description.

Sample Input

10

Sample Output

720

5. Module Trouble

Problem Description

Shikha is trying to solve a hard math problem in which she is required to take the **mod** of a number **x** with **y** quite frequently. Given two numbers **x** and **y** write a program that helps Shikha do this easily. Assume that the value of **y** is always greater than **0**.

Input Format

Two lined inputs. The first line denotes the x value and the second one the y value.

Output Format

Single number which is the mod of x with y.

Sample Input

100
11

Sample Output

1

6. Four average

Problem Description

Given four numbers as input print their average value as output.

Input Format

Four lines denoting four numbers.

Output Format

Single number denoting the average value.

Sample Input

```
1
2
3
4
```

Sample Output

```
2.5
```

7. Odd/Even – without 'if' statements

DO NOT USE if statements IN THIS EXAMPLE.

Problem Description

Given an integer **n** as input, print **True** if it is **odd** and **False** if it is **even**.

Input Format

A single line input containing the integer.

Output Format

A single-line boolean value.

Sample Input

2

Sample Output

False

Sample Explanation

The output is False because 2 is even.

Note: **This question can be solved with the concepts taught in the Lecture on Operators.**

8. Are the weights balanced?

Problem Description

A weighing machine has two arms, a **left arm**, and a right arm. On both sides of the weighing machine we can put in weights and if both of those weights are equal, the arms of the machine will hang equally in the air, with none of them hanging below the other. This is hard to observe visually hence you are asked to write a program that takes in two weight values as input and outputs **True** if they will leave the machine **balanced** and **False** if they will leave the machine **unbalanced**.

Input Format

The input will contain two lines denoting the weight values on the left and right arms of the machine

Output Format

True if the machine is balanced. False if the machine is unbalanced.

Sample Input

64.0
63.0

Sample Output

False

9. Raised to the power

What do you think would be the output when we run the piece of code given below?

```
print(3 ** 2 ** 0)
```

- A. 0
- B. 1
- C. 2
- D. 3

10. Greater String

What would be the output of the following piece of code?

```
print("abcd" < "abce")
```

- A. Yes
- B. True
- C. False
- D. Error
- E. No