Lab 1

08/07/2024

Brief Summary:

This script performs various mathematical operations based on user input. It includes functions for:

1. **Basic Arithmetic Operations**: Addition, subtraction, multiplication, and division.
2. **LCM (Lowest Common Multiple)**: Calculating the LCM of two numbers.
3. **HCF (Highest Common Factor)**: Calculating the HCF of two numbers.
4. **Factorial**: Calculating the factorial of a number.

Problem Areas

1. **Division by Zero**: The division function handles division by zero.
2. **Non-integer Factorials**: The HCF and factorial functions check if the numbers are integers and handle errors for non-integer inputs.
3. **User Input Handling**: The script includes error handling for non-numeric user inputs.

Operations

1. **Arithmetic Operations**:
   o Addition, subtraction, multiplication, and division results of the two numbers are printed.
2. **LCM and HCF**:
   o The LCM and HCF of the two numbers are calculated and printed.
3. **Factorials**:
   o Factorials of both numbers are calculated and printed.

Code:

```python
import math

# Print Hello World
print("Hello World")


# Functions
def addition(x, y):
    return x + y


def subtraction(x, y):
    return x - y
```

```python
def multiplication(x, y):
    return x * y


def division(x, y):
    if y == 0:
        return "Error: Division by zero"
    return x / y


def calculate_lcm(x, y):
    if x > y:
        greater = x
    else:
        greater = y
    while True:
        if (greater % x == 0) and (greater % y == 0):
            lcm = greater
            break
        greater += 1
    return lcm


def calcuate_hcf(x, y):
    if x > y:
        smaller = y
    else:
        smaller = x

    if not float(smaller).is_integer():
        return "Error: Factorial of non-integer"
    smaller = int(smaller)

    for i in range(1, smaller + 1):
        if (x % i == 0) and (y % i == 0):
            hcf = i
    return hcf


def factorial(num):
    if num < 0:
        return "Error: Factorial of negative number"
    if not num.is_integer():
        return "Error: Factorial of non-integer"
    num = int(num)
```

```python
    fact = 1
    for i in range(1, num + 1):
        fact *= i
    return fact


# User Input
try:
    x = float(input("Enter first number: "))
    y = float(input("Enter second number: "))
except ValueError:
    print("Invalid input! Please enter numeric values.")
    exit(1)

# Operations
addition_result = addition(x, y)
subtraction_result = subtraction(x, y)
multiplication_result = multiplication(x, y)
division_result = division(x, y)

print(f"The addition of {x} and {y} is {addition_result}")
print(f"The subtraction of {x} and {y} is {subtraction_result}")
print(f"The multiplication of {x} and {y} is {multiplication_result}")
print(f"The division of {x} and {y} is {division_result}")

# Display the largest number
print(f"The largest number is {max(x, y)}")

# LCM & HCF
lcm_result = calculate_lcm(x, y)
hcf_result = calcuate_hcf(x, y)
print(f"The Lowest Common Multiple of {x} and {y} is {lcm_result}")
print(f"The Highest Common Factor of {x} and {y} is {hcf_result}")

# Factorial
try:
    factorial_result1 = factorial(x)
    factorial_result2 = factorial(y)
    print(f"The factorial of {x} is {factorial_result1}")
    print(f"The factorial of {y} is {factorial_result2}")
except ValueError as e:
    print(e)
```

Output:

```
PS D:\CSE449 - Artificial Intelligence> & "C:/Program Files/Python312/python.exe" "d:/CSE449 - Artificial Intelligence/Lab1/Assignment
.py"
Hello World
Enter first number: 5
Enter second number: 17
The addition of 5.0 and 17.0 is 22.0
The subtraction of 5.0 and 17.0 is -12.0
The multiplication of 5.0 and 17.0 is 85.0
The division of 5.0 and 17.0 is 0.29411764705882354
The largest number is 17.0
The Lowest Common Multiple of 5.0 and 17.0 is 85.0
The Highest Common Factor of 5.0 and 17.0 is 1
The factorial of 5.0 is 120
The factorial of 17.0 is 355687428096000
```