AI4ICPS IIT Kharagpur	**IIT KHARAGPUR AI4ICPS I HUB FOUNDATION** **H**ands-on **A**pproach to **AI, Cohort-2, July – October 2024** **Programming Assignment 1**

Due date: Friday 26th July 2024, EOD – IST.

Important Instructions about Programming Assignments

1. Programming assignments will be evaluated automatically. **Do not** change the skeleton code provided to you.
2. Write your code **only in the designated places** in the skeleton code and process the input data provided to you in the designated variables. **Do not alter** the input output structure in the skeleton code.
3. **Do not import** any additional libraries. **Do not use any additional files** for the processing (other than those mentioned in the skeleton code).
4. Failure to comply with these instructions may lead to you getting **zero marks** for the assignment, even if the solution is largely correct.

Question:

Objective: Write a Python program that computes the series $S = \sum_{k=1}^{ip} \frac{frac(k)}{k^2}$ for the given input ip, based on the factorial of a given integer. The output should be rounded to two decimal points.

The program will receive the integer input(ip) as a command line argument and will be tested with 5 different test cases.

Instructions:

1. **Do not import any more libraries or modify any functions except the `series` function.**
2. **Input for evaluating the test cases will be provided as command line arguments.**
3. **The output must be rounded to two decimal places.**
4. **If the input is a negative number the program should return 999.0.**

Explanation:

- The `frac` function calculates the factorial of a given number `n`.
- It recursively multiplies `n` by the factorial of `n-1`.
- Special cases: `frac(0)` returns 0 and `frac(1)` returns 1.
- The `series` function takes an integer input and computes the sum of a series based on the factorial() function and returns the result as a floating point number.

- The main block (`if __name__ == "__main__":`) ensures that the program runs only when executed directly and not when imported.

Calculations:

For a given integer input `ip`, the series is calculated as:

$$S = \sum_{k=1}^{ip} \frac{frac(k)}{k^2}$$

$for\ ip = 3,\ S = \frac{frac(1)}{1^2} + \frac{frac(2)}{2^2} + \frac{frac(3)}{3^2}$, the output should be 2.17

```
test@test-PC:~/Documents/AI4ICPS$ python3 your_program.py 1
1.0
test@test-PC:~/Documents/AI4ICPS$ python3 your_program.py 2
1.5
test@test-PC:~/Documents/AI4ICPS$ python3 your_program.py 3
2.17
test@test-PC:~/Documents/AI4ICPS$ python3 your_program.py 4
3.67
test@test-PC:~/Documents/AI4ICPS$ python3 your_program.py 5
8.47
```