

Series Problems (Task 1 – Task 6)

Task 1: Sum of the Series

Problem Statement

Calculate the sum of the series:

$$1 + 1/2^2 + 1/3^3 + \dots + 1/n^n$$

Input

- An integer n

Output

- Sum of the series up to n terms

Sample Input

3

Sample Output

1.162037

Explanation

$$\begin{aligned} &1 + 1/2^2 + 1/3^3 \\ &= 1 + 1/4 + 1/27 \\ &= 1.162037 \end{aligned}$$

Task 2: Sum of Squares Series

Problem Statement

Calculate the sum of the series:

$$(1 \times 1) + (2 \times 2) + \dots + (n \times n)$$

Input

- An integer n

Output

- Sum of squares up to n

Sample Input

4

Sample Output

30

Explanation

$$\begin{aligned} &1^2 + 2^2 + 3^2 + 4^2 \\ &= 1 + 4 + 9 + 16 \\ &= 30 \end{aligned}$$

Task 3: Sum of Natural Number Series

Problem Statement

Calculate the sum of the series:

$$(1) + (1+2) + (1+2+3) + \dots + (1+2+\dots+n)$$

Input

- An integer n

Output

- Total sum of the series

Sample Input

3

Sample Output

10

Explanation

```
1 + (1+2) + (1+2+3)
= 1 + 3 + 6
= 10
```

Task 4: Alternating Power Series

Problem Statement

Calculate the sum of the series:

$1 - x^2/2! + x^4/4! - x^6/6! + \dots$ up to n terms

Input

- Integer x
- Integer n

Output

- Sum of the series

Sample Input

```
x = 2
n = 3
```

Sample Output

0.333333

Explanation

$$\begin{aligned} &1 - 2^2/2! + 2^4/4! \\ &= 1 - 2 + 0.666667 \\ &= 0.333333 \end{aligned}$$

Task 5: Pattern Number Series

Problem Statement

Calculate the sum of the series:

$$9 + 99 + 999 + \dots \text{ (n terms)}$$

Input

- An integer n

Output

- Sum of the pattern series

Sample Input

3

Sample Output

1107

Explanation

$$\begin{aligned} &9 + 99 + 999 \\ &= 1107 \end{aligned}$$

Task 6: Exponential Series

Problem Statement

Calculate the sum of the series:

$$1 + x + x^2/2! + x^3/3! + \dots \text{ up to } n \text{ terms}$$

Input

- Integer x
- Integer n

Output

- Sum of the series

Sample Input

```
x = 2
n = 4
```

Sample Output

```
7.000000
```

Explanation

$$\begin{aligned} &1 + 2 + 2^2/2! + 2^3/3! \\ &= 1 + 2 + 2 + 1.333333 \\ &= 6.333333 \end{aligned}$$

☒ **Note:**

- Use `double` or `float` for precision-based outputs.
- Factorial calculations should be handled carefully to avoid overflow.

 *End of Series Problems*