

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

$$\begin{aligned}1 &+ (1+2) + (1+2+3) \\&= 1 + 3 + 6 \\&= 10\end{aligned}$$

Task 4: Alternating Power Series

Problem Statement

Calculate the sum of the series:

```
1 - x2/2! + x4/4! - x6/6! + ... 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 + x2/2! + x3/3! + ... up to n 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.
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End of Series Problems