

Problem C

Summation of Polynomials

Input: standard input

Output: standard output

Time Limit: 1 second

Memory Limit: 32 MB

The following text was taken from a book of mathematics:

The antidifference of a function $f(x)$ is the function $g(x)$ such that $f(x) = g(x+1) - g(x)$. So, if we have a summation of $f(x)$, it can be simplified by the use of its antidifference in the following way:

$$\begin{aligned} f(k) + f(k+1) + f(k+2) + \dots + f(k+n) &= \\ g(k+1) - g(k) + g(k+2) - g(k+1) + g(k+3) - g(k+2) + \dots + g(k+n+1) - g(k+n) &= \\ g(k+n+1) - g(k) \end{aligned}$$

A factorial polynomial is expressed as $k^{\{n\}}$ meaning the following expression: $k * (k-1) * (k-2) * \dots * (k-(n-1))$. The antidifference of a factorial polynomial $k^{\{n\}}$ is $k^{\{n+1\}} / (n+1)$.

So, if you want to calculate $S_n = p(1) + p(2) + p(3) + \dots + p(n)$, where $p(i)$ is a polynomial of degree k , we can express $p(i)$ as a sum of various factorial polynomials and then, find out the antidifference $P(i)$. So, we have $S_n = P(n+1) - P(1)$.

Example:

$$\begin{aligned} S &= 2*3 + 3*5 + 4*7 + 5*9 + 6*11 + \dots + (n+1)*(2n+1) = \\ p(1) + p(2) + p(3) + p(4) + p(5) + \dots + p(n), \text{ where } p(i) &= (i+1)(2i+1) \end{aligned}$$

Expressing $p(i)$ as a factorial polynomial, we have:

$$p(i) = 2(i)^{\{2\}} + 5i + 1.$$

$P(i) = (2/3)(i)^{\{3\}} + (5/2)(i)^{\{2\}} + i$. Calculating $P(n+1) - P(1)$ we have

$$S = (n/6) * (4n^2 + 15n + 17)$$

Given a number $1 \leq x \leq 50,000$, one per line of input, calculate the following summation:

$$1 + 8 + 27 + \dots + x^3$$

Input and Output

Input file contains several lines of input. Each line contain a single number which denotes the value of x . Input is terminated by end of file.

For each line of input produce one line of output which is the desired summation value.

Sample Input

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1
2
3
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Sample Output

1
9
36

(The Joint Effort Contest, Problem setter: Rodrigo Malta Schmidt)