Project Euler #239: Twenty-two Foolish Primes

This problem is a programming version of Problem 239 from projecteuler.net

A set of disks numbered 1 through n are placed in a line in random order.

What is the probability that we have a partial derangement such that exactly k prime number discs are found away from their natural positions? (Any number of non-prime disks may also be found in or out of their natural positions.)

It can be shown that for a given constraints the answer can be represented as $\frac{a}{b}$, where a and b are coprime positive integers and $b \not\equiv 0 \pmod{10^9 + 123}$. Print the value of $a \cdot b^{-1}$ modulo $10^9 + 123$.

Input Format

The only line of input contains two integers n and k separated by single space.

Constraints

- $2 \le n \le 10\,000\,000$
- $1 \le k \le P(n)$ where $P(n)$ is number of primes in range from 1 to n inclusive.

Output Format

Print the only line with the answer.

Sample Input 0

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10 3
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Sample Output 0

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498412760
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Explanation 0

The actual value of $\frac{a}{b}$ is $\frac{89}{315}$.