Problem A. Vera and Outfits

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Vera owns N tops and N pants. The i-th top and i-th pants have colour i, for $1 \leq i \leq N$, where all N colours are different from each other.

An outfit consists of one top and one pants. Vera likes outfits where the top and pants are not the same colour.

How many different outfits does she like?

Constraints:

$1 \leq N \leq 2017$

N is integer

Input

The input will be in the format:

N

Output

Output one line with the number of different outfits Vera likes.

Examples

standard input	standard output
1	0
2	2
5	20

Problem B. Vera And LCS

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Vera is learning about the longest common subsequence problem.

A string is a (possibly empty) sequence of lowercase letters. A subsequence of a string S is a string obtained by deleting some letters of S (possibly none or all). For example "*vra*", "*a*", "", and "*vera*" are all subsequences of "*vera*". The *longest common subsequence (LCS)* of two strings, A and B, is a string that is a subsequence of both A and B that has the maximum length among all strings that are a subsequence of both A and B. There could be multiple LCS for two given strings. For example a LCS of "*vera*" and "*eats*" is "*ea*".

For homework she was given two strings A and B, both of length N and she had to determine the length of the LCS of A and B. She determined the answer to be K but lost B. Given A and K, help her find a possible value of B. It is possible that Vera may have made a mistake and no such B exists, in that case output "`WRONGANSWER"`(without quotes).

Constraints:

$1 \leq N \leq 2000$

$0 \leq K \leq 2000$

N, K are integers

A consists of N lowercase letters

Input

The input will be in the format:

N K

A

Output

Output one line consisting of the string B of N lowercase letters, or "$WRONGANSWER$" if no B is valid. If there are multiple correct B output any of them.

Examples

standard input	standard output
`4 2` `vera`	`eats`
`4 5` `vera`	`WRONGANSWER`

Note

For the first example, another possible answer is "*uber*".

Problem C. Vera and Mean Sorting

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

The *harmonic mean* of a sequence of positive integers $x_1, \cdots, x_N$ is

$$H(x_1, \cdots, x_N) = \left(\frac{\sum_{i=1}^{N} x_i^{-1}}{N} \right)^{-1}.$$

Vera classifies an array of positive integers $A = [A_1, \cdots, A_N]$ of length N as K-*mean-sorted* if $M(i) \geq M(i+1)$ for $1 \leq i \leq N - K$ where

$$M(i) = H(A_i, \cdots, A_{i+K-1}).$$

A *permutation* P is an ordered set of integers $P_1, P_2, \cdots, P_N$, consisting of N distinct positive integers, each of which are at most N.

Permutation P is *lexicographically smaller* than permutation Q if there is an i $(1 \leq i \leq N)$, such that $P_i < Q_i$, and for any j $(1 \leq j < i)$ $P_j = Q_j$.

Given integers N and K, help Vera find the lexicographically smallest permutation P of integers 1 to N such that P is K-mean-sorted but not L-mean-sorted for $1 \leq L \leq N-1, L \neq K$.

If no such permutation exists output 0.

Constraints:

$2 \leq N \leq 100$

$1 \leq K \leq N - 1$

N, K are integers

Input

The input will be in the format:

N K

Output

Output one line with the desired permutation. If such permutation does not exist output one line with 0.

Examples

standard input	standard output
`3 2`	`2 3 1`
`4 1`	`0`

Problem D. Vera and Sorting

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Vera is very smart and invented a new sorting algorithm. She coded the following Python function to count how many steps her algorithm takes.

```
def steps(array):
  if len(array) == 0:
    return 0
  pivot = array[0]
  count = 0
  lesser = []
  greater = []
  for element in array:        ## looks at each element in the array
    count += 1
    if element < pivot:
      lesser.append(element)   ## e.g. [1,3].append(5) => [1,3,5]
    elif element > pivot:
      greater.append(element)
  return count + steps(lesser) + steps(greater)
```

A *permutation* P is an ordered set of integers $P_1, P_2, \cdots, P_N$, consisting of N distinct positive integers, each of which are at most N. We will call the number N the *size* of the permutation.

You are given integers N and K.

Help Vera count the number of permutations P of size N such that steps(P) returns the value K. This number could be large, so output it modulo $10^9 + 7$.

Constraints:

$1 \le N \le 30$

$1 \le K \le 900$

N, K are integers

Input

The input will be in the format:

N K

Output

Output one integer, the number of possible permutations, modulo $10^9 + 7$.

Examples

standard input	standard output
3 5	2
5 29	0
20 100	262859528

Note

For the first example, the 2 valid permutations are $2, 1, 3$ and $2, 3, 1$.

Problem E. Vera and Love Triangles

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Vera has N friends numbered from 0 to $N-1$. Being in Software Engineering, all her friends do not have enough spare time to engage in relationships. However, friends have crushes on each other.

If x is a non-negative integer, let $g(x)$ be the number of ones in the binary representation of x.

Let $f(i,j) = g((A \cdot B^{(i \cdot N+j)})\%M)$, where A, B, M are integer constants.

It is known that for any 2 friends i and j where $i < j$, if $f(i,j)$ is even then i has a crush on j, otherwise j has a crush on i.

Vera thinks love triangles are very funny. A *love triangle* is a set of 3 friends i, j, k such that i has a crush on j, j has a crush on k and k has a crush on i.

Given integers N, M, A, B tell Vera how many love triangles exist among her friends. Two love triangles are different if they contain a different set of 3 friends.

Constraints:

$3 \leq N, M \leq 200,000$

$0 < A, B < M$

N, M, A, B are integers

M is prime

Input

The input will be in the format:

$N\ M\ A\ B$

Output

Output one line with the number of love triangles.

Examples

standard input	standard output
`3 5 3 4`	`1`
`3 3 1 2`	`0`
`1337 10007 1337 1337`	`99141170`

Note

Let $a \to b$ denote that friend a has a crush on friend b.

For the first example, ~~$f(0,1) = 2$, $f(0,2) = 3$, and $f(1,2) = 2$~~. So $0 \to 2$, $2 \to 1$, and $1 \to 0$, so there is one love triangle. `f(0,1)=g(2)=1, f(0,2)=g(3)=2, f(1,2)=g(2)=1`

For the second example, $1 \to 0$, $2 \to 0$, and $2 \to 1$, so there are zero love triangles.