Problem 1 Warm-Up (3%)

Read an integer k and compute its factorial $k!$. The answer can be very large so output its value modulo $10^9 + 7$.

Input

The first line contains an integer n, $(1 \leq n \leq 100)$, the number of test cases.
Then n lines follow, each of which contains an integer k, $(1 \leq k \leq 10^5)$, to be tested.

Output

For each input integer k output $k! \mod 10^9 + 7$.

Example

Sample Input

```
4
3
6
30
100
```

Sample Output

```
6
720
109361473
437918130
```

Note

In this example, we have

- $$\begin{aligned} 3! \mod 10^9+7 &= 1 \times 2 \times 3 \mod 10^9+7 \\ &= 6 \end{aligned}$$

- $$\begin{aligned} 6! \mod 10^9+7 &= 1 \times 2 \times \ldots \times 6 \mod 10^9+7 \\ &= 720 \end{aligned}$$

- Note that, since

$$i \times j \times k \mod p = (\, i \times j \mod p\,) \times k \mod p,$$

you can take modulo along your computation to prevent overflow in this assignment.

Problem 2 Gaussian Elimination (5%)

Deciding the dimension of a vector space is a fundamental problem in linear algebra. That is, to determine the number of bases (linearly independent vectors) from a given set of vectors.

This can be done using Gaussian Elimination (高斯消去法).

To simplify the problem, we consider only $\{0,1\}$-vectors, and we take the value modulo 2 after every computation, i.e., $1+1$ becomes 0, since $1+1 \equiv 0 \mod 2$. For example,

$$(1,0,1)+(1,0,0) \Rightarrow (0,0,1) \quad \text{and} \quad (0,0,1)+(0,0,1) \Rightarrow (0,0,0).$$

Given a set of $\{0,1\}$ vectors, please determine the dimension of the linear subspace it spans.

Input

The first line contains two integers n and m, $(1 \leq n \leq 20, 1 \leq m \leq 1000)$, the length of the coordinates and the number of input vectors.

The next m lines contain n integers, i.e., at the i^th line are the coordinates $a_{i,1}, a_{i,2}, \ldots, a_{i,n}$, $a_{i,j} \in \{0,1\}$, of the i^th input vector.

Output

Print the dimension of the subspace. (the number of linearly independent vectors)

Example

Sample Input

```
4 3
1 0 0 1
0 1 0 1
1 1 0 0
```

Sample Output

```
2
```

Note

In this example, we can eliminate (”cancel out”) the third vector $(1,1,0,0)$ using the first two vectors, and at most two vectors out of three can be linearly independent.