

# King and Four Sons

The King of Byteland wants to grow his territory by conquering  $K$  other countries. To prepare his 4 heirs for the future, he decides they must work together to capture each country.

The King has an army,  $A$ , of  $N$  battalions; the  $i^{th}$  battalion has  $A_i$  soldiers. For each battle, the heirs get a detachment of soldiers to share but will fight amongst themselves and lose the battle if they don't each command the same number of soldiers (i.e.: the detachment must be divisible by 4). If given a detachment of size 0, the heirs will fight alone without any help.

The battalions chosen for battle must be selected in the following way:

1. A subsequence of  $K$  battalions must be selected (from the  $N$  battalions in army  $A$ ).
2. The  $j^{th}$  battle will have a squad of soldiers from the  $j^{th}$  selected battalion such that its size is divisible by 4.

The soldiers within a battalion have unique strengths. For a battalion of size 5, the detachment of soldiers  $\{0, 1, 2, 3\}$  is *different* from the detachment of soldiers  $\{0, 1, 2, 4\}$

The King tasks you with finding the number of ways of selecting  $K$  detachments of battalions to capture  $K$  countries using the criterion above. As this number may be quite large, print the answer modulo  $10^9 + 7$ .

## Input Format

The first line contains two space-separated integers,  $N$  (the number of battalions in the King's army) and  $K$  (the number of countries to conquer), respectively.

The second line contains  $N$  space-separated integers describing the King's army,  $A$ , where the  $i^{th}$  integer denotes the number of soldiers in the  $i^{th}$  battalion ( $A_i$ ).

## Constraints

- $1 \leq N \leq 10^4$
- $1 \leq K \leq \min(100, N)$
- $1 \leq A_i \leq 10^9$
- $1 \leq A_i \leq 10^3$  holds for test cases worth at least 30% of the problem's score.

## Output Format

Print the number of ways of selecting the  $K$  detachments of battalions modulo  $10^9 + 7$ .

## Sample Input

```
3 2
3 4 5
```

## Sample Output

```
20
```

## Explanation

First, we must find the ways of selecting **2** of the army's **3** battalions; then we must find all the ways of selecting detachments for each choice of battalion.

*Battalions  $\{A_0, A_1\}$ :*

$A_0$  has **3** soldiers, so the only option is an empty detachment ( $\{\}$ ).

$A_1$  has **4** soldiers, giving us **2** detachment options ( $\{\}$  and  $\{0, 1, 2, 3\}$ ).

So for this subset of battalions, we get  $1 \times 2 = 2$  possible detachments.

*Battalions  $\{A_0, A_2\}$ :*

$A_0$  has **3** soldiers, so the only option is an empty detachment ( $\{\}$ ).

$A_2$  has **5** soldiers, giving us **6** detachment options ( $\{\}$ ,  $\{0, 1, 2, 3\}$ ,  $\{0, 1, 2, 4\}$ ,  $\{1, 2, 3, 4\}$ ,  $\{0, 1, 3, 4\}$ ,  $\{0, 2, 3, 4\}$ ). So for this subset of battalions, we get  $1 \times 6 = 6$  possible detachments.

*Battalions  $\{A_1, A_2\}$ :*

$A_1$  has **4** soldiers, giving us **2** detachment options ( $\{\}$  and  $\{0, 1, 2, 3\}$ ).

$A_2$  has **5** soldiers, giving us **6** detachment options ( $\{\}$ ,  $\{0, 1, 2, 3\}$ ,  $\{0, 1, 2, 4\}$ ,  $\{1, 2, 3, 4\}$ ,  $\{0, 1, 3, 4\}$ ,  $\{0, 2, 3, 4\}$ ).

So for this subset of battalions, we get  $2 \times 6 = 12$  possible detachments.

In total, we have  $2 + 6 + 12 = 20$  ways to choose detachments, so we print  $20 \% (10^9 + 7)$ , which is **20**.