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Algorithms Lab

Exercise – *From Russia with Love*

On the way from Istanbul to Trieste, the evil SPECTRE agent Grant has infiltrated the train. His goal is brutal: he has orders to assassinate James Bond. Fortunately, our hero is not an easy target. The two have clashed in one of the sleeping cars, and during their fight Bond used his suitcase to fend off Grant. Now the suitcase is broken and all its contents are scattered on the floor. The fight continues in the restaurant car...

In the meantime, passengers $p_0, \ldots, p_{m-1}$ have come to the sleeping car to see what all the noise is about. They find traces of a fight and, interestingly, n coins on the floor. Quickly they realize that these coins are old British sovereigns, which are quite valuable. (Probably Bond brought them to use as a bribe.) The passengers decide to split the sovereigns among them before Bond and Grant return. They plan to use the following splitting procedure.

All sovereigns are placed on a straight line so that they appear as $s_0, \ldots, s_{n-1}$ from left to right. For every sovereign s_i they know its value x_i in pounds. Now p_0 starts and picks either the leftmost (s_0) or the rightmost sovereign (s_{n-1}) and adds it to her pile. Then p_1 does the same on the remaining line of sovereigns. If p_0 picked s_0, then p_1 has the choice between s_1 and s_{n-1}. Otherwise, p_0 picked s_{n-1}, which leaves p_1 the choice between s_0 and s_{n-2}. Then $p_2, \ldots, p_{m-1}$ continue in the same fashion. After p_{m-1} takes a sovereign, it is again p_0's turn and the whole procedure repeats until there are no more sovereigns left. The *winnings* of a passenger are the sum of values of all sovereigns in her pile at the end of the procedure.

Given an integer $k \in \{0, \ldots, m-1\}$, you have to find the largest possible winnings that passenger p_k can collect *regardless* of how other passengers play. Notice that the word "regardless" implies that you cannot make any assumption of what the other passengers do. In particular, they may not play to maximize their own winnings.

Input The first line of the input contains the number $t \leq 30$ of test cases. Each of the t test cases is described as follows.

- It starts with a line that contains three integers `n m k`, separated by a space. They denote
  - n, the number of sovereigns ($1 \leq n \leq 10^3$);
  - m, the number of passengers ($1 \leq m \leq 5 \cdot 10^2$);
  - k, the index of the passenger whose winnings you are interested in ($0 \leq k \leq m-1$).
- The following line defines the value of the sovereigns in pounds. The line contains n integers $\texttt{x}_0 \ \ldots \ \texttt{x}_{n-1}$, separated by a space and such that $0 \leq x_i \leq 2^{10}$, for $i \in \{0, \ldots, n-1\}$.

Output For each test case the corresponding output appears on a separate line. It consists of one integer w which denotes the largest winnings that passenger p_k can collect, regardless of how other passengers play.

Points There are four groups of test sets, which are worth 100 points in total.

1. For the first group of test sets, worth 20 points, you may assume that there are exactly two passengers p_0 and p_1 and you are interested in the winnings of p_1 ($m = 2$ and $k = 1$).
2. For the second group of test sets, worth 30 points, you may assume that there are no more than three passengers and you are interested in the winnings of the last passenger ($m \leq 3$ and $k = m - 1$).
3. For the third group of test sets, worth 30 points, there are no additional assumptions.
4. For the fourth group of test sets, which is hidden and worth 20 points, there are no additional assumptions.

Corresponding sample test sets are contained in `test`i`.in/out`, for $i \in \{1, 2, 3\}$.

Sample Input

```
3
5 2 1
1 3 2 5 4
5 3 2
1 1 8 5 5
7 3 1
100 100 1 1 8 5 5
```

Sample Output

```
8
5
105
```