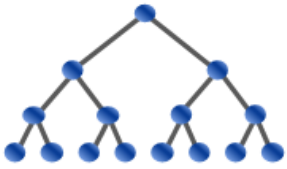
USA Computing Olympiad



USACO 2024 February Contest, Platinum
Problem 2. Minimum Sum of Maximums

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Contest has ended.

Log in to allow submissions in analysis mode

English (en)

Bessie has N ($2 \le N \le 300$) tiles in a line with ugliness values $a_1, a_2, \ldots, a_N$ in that order ($1 \le a_i \le 10^6$). K ($0 \le K \le \min(N, 6)$) of the tiles are stuck in place; specifically, those at indices $x_1, \ldots, x_K$ ($1 \le x_1 < x_2 < \cdots < x_K \le N$).

Bessie wants to minimize the total ugliness of the tiles, which is defined as the sum of the maximum ugliness over every consecutive pair of tiles; that is, $\sum_{i=1}^{N-1} \max(a_i, a_{i+1})$. She is allowed to perform the following operation any number of times: choose two tiles, neither of which are stuck in place, and swap them.

Determine the minimum possible total ugliness Bessie can achieve if she performs operations optimally.

INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains N and K.

The next line contains $a_1, \ldots, a_N$.

The next line contains the K indices $x_1, \ldots, x_K$.

OUTPUT FORMAT (print output to the terminal / stdout):

Output the minimum possible total ugliness.

SAMPLE INPUT:

```
3 0
1 100 10
```

SAMPLE OUTPUT:

```
110
```

Bessie can swap the second and third tiles so that $a = [1, 10, 100]$, achieving total ugliness $\max(1, 10) + \max(10, 100) = 110$. Alternatively, she could swap the first and second tiles so that $a = [100, 1, 10]$, also achieving total ugliness $\max(100, 1) + \max(1, 10) = 110$.

SAMPLE INPUT:

```
3 1
1 100 10
3
```

SAMPLE OUTPUT:

```
110
```

Bessie could swap the first and second tiles so that $a = [100, 1, 10]$, achieving total ugliness $\max(100, 1) + \max(1, 10) = 110$.

SAMPLE INPUT:

```
3 1
1 100 10
2
```

SAMPLE OUTPUT:

```
200
```

The initial total ugliness of the tiles is $\max(1, 100) + \max(100, 10) = 200$. Bessie is only allowed to swap the first and third tiles, which does not allow her to reduce the total ugliness.

SAMPLE INPUT:

```
4 2
1 3 2 4
2 3
```

SAMPLE OUTPUT:

```
9
```

SCORING:

- Input 5: $K = 0$
- Inputs 6-7: $K = 1$
- Inputs 8-12: $N \leq 50$
- Inputs 13-24: No additional constraints

Problem credits: Benjamin Qi

Contest has ended. No further submissions allowed.