TLE '17 Contest 5 P2 - Delivery Service II

Fax McClad, Croneria's most punctual bounty hunter, has been hastily hired by the Cronerian government to ship weapons.

There are N planets arranged in a straight line in the Lylot system, numbered from 1 to N. The ith planet is located x_i spacemiles from the origin of the system. It is guaranteed that no two planets have the same location.

There are D deliveries that Fax needs to make. The jth delivery consists of Fax transporting weapons from planet p_{j_1} to planet p_{j_2}, $p_{j_1} \neq p_{j_2}$. Fax's ship can carry an unlimited amount of weapons. This means that Fax can handle more than one delivery at once.

Delivering weapons on the Great Fax.

However, turning around costs a lot of fuel (since Fax must accelerate his ship in the opposite direction), so Fax will turn around at most once.

Fax can start anywhere along the line of planets and can start travelling in any direction. Can you tell Fax the minimum number of spacemiles that he will need to travel?

Input Specification

The first line of input will contain two space-separated integers N $(2 \leq N \leq 10^5)$ and D $(1 \leq D \leq 10^5)$.

N lines of input follow. The ith line will contain a single integer, x_i $(|x_i| \leq 10^8)$.

D lines of input follow. The jth line will contain two space-separated integers, p_{j_1} and p_{j_2}.

For 20% of the points, $N, D \leq 10$

For an additional 20% of the points, $|x_i| \leq 100$.

For an additional 20% of the points, $N, D \leq 10^3$.

Output Specification

Output a single integer, the minimum number of spacemiles that Fax needs to travel to complete all deliveries. If it is impossible, output `-1`.

Sample Input

```
3 3
0
-2
4
1 3
2 3
3 2
```

Sample Output

```
12
```

Explanation for Sample Output

Fax can start at planet 2, pick up weapons on planet 1, drop the first two deliveries at planet 3 and then turn around to complete the last delivery.