الأرض السيبرانية

امتد الزمن وبلغنا العام 3742، وجاء دور الأرض السيبرانية لتستضيف الأولمبياد المعلوماتي في آسيا والمحيط الهادئ APIO. يوجد في عالمنا هذا N دولة مفهرسة من 0 حتى N-1، إضافة إلى M طريق ثنائي الاتجاه (يتيح كل منها إمكان السفر في الاتجاهين) مفهرسة من 0 إلى M-1. يصل كل طريق بين دولتين مختلفتين، وهما x[i] و y[i] ويحتاج إلى زمن مقداره c[i] لاجتيازه. اجتمع جميع المشاركين في الأرض السيبرانية استعداداً للمسابقة، عدا الدولة التي تنتمي إليها أنت. أنت تعيش في الدولة 0 في حين فهرس الأرض السيبرانية هو H . وباعتبارك أذكى شخص في دولتك، فقُد جرى الاستعانة بك هنا أيضاً، وبالتحديد طلب منك أن تحدد الزمن الأصغري اللازم للوصول من دولتك إلى الأرض السيبرانية.

يمكن لبعض الدول أن تصفَر الزمن الإجمالي للعبور. كما يمكن لبعضها الآخر أن يقسم الزمن على 2 (لديها قدرة على القسمة على 2)

You can visit a country repeatedly . Every time you visit a country, **you may choose whether to use the special ability in the country**. But you can use the special ability **at most once in a single visit** (which means that special ability can be used multiple times by visiting the country multiple times). Moreover, you can only use the divide-by-2 ability at most K times **in case of being caught by Cyberland Chemistry Foundation .** Once you reached Cyberland, you cannot .move anywhere** because the great APIO contest will be held soon

An array arr is given, where arr_i shows the special abilities of country i. There are 3 types of special abilities

- $arr_i = 0$, means this country makes the passing time 0.
- $arr_i = 1$, means the passing time remains unchanged at this country.
- $arr_i = 2$, means this country divides the passing time by 2.

It's guaranteed that $arr_0 = arr_H = 1$ holds. In other words, Cyberland and your country don't .have any special abilities

Your country does not want to miss any moment of APIO, so you need to find the minimum time to reach Cyberland. If you cannot reach to Cyberland, your answer should be -1 .

Implementation Details

:You need to implement the following function

```
double solve(int N, int M, int K, int H, std::vector<int> x, std::vector<int>
                                    y, std::vector<int> c, std::vector<int> arr);
```

- N: The number of countries.
- M: The number of bidirectional roads.

- .The limit of divide-by-2 ability usage :K
- .The index of the country Cyberland :H
- three arrays with a length of M. the tuple $(x[i], y[i], c[i])$ represents the i-th :x, y, c .$c[i]$ undirected edge which connects country $x[i]$ and $y[i]$, with time cost
- .i an array with a length of N. $arr[i]$ represents the special ability of country :arr
- This procedure should return the minimum time to reach Cyberland from your country if .you can reach Cyberland, and -1 if you can't do so
- .This procedure can be called more than once

Assume that return value of contestant's is ans_1, and the return value of standard's is ans_2, .$\frac{|ans_1 - ans_2|}{\max\{ans_2, 1\}} \leq 10^{-6}$ your return value is considered correct if and only if

Note: **Since the procedure can be called more than once, contestants need to pay attention .to the impact of the remaining data of the previous call on the current call**

Examples

Example 1

:Consider the following call

```
solve(3, 2, 30, 2, {1, 2}, {2, 0}, {12, 4}, {1, 2, 1});
```

The only path to Cyberland is $0 \to 2$, because you can not move to anywhere after reaching .Cyberland. The calculation of passing time is shown as below

country number	passing time
0	0
2	0 + 4 $\to$ 4(sum) $\to$ 4(special ability)

.4 Therefore, the procedure should return

Example 2

:Consider the following call

```
solve(4, 4, 30, 3, {0, 0, 1, 2}, {1, 2, 3, 3}, {5, 4, 2, 4}, {1, 0, 2, 1});
```

.$0 \to 2 \to 3$ There are two paths from your country to Cyberland. They are: $0 \to 1 \to 3$ and

.If your path is $0 \to 1 \to 3$, the calculation of passing time is shown as below

country number	passing time
0	0
1	0 + 5 $\rightarrow$ 5(sum) $\rightarrow$ 0(special ability)
3	0 + 2 $\rightarrow$ 2(sum) $\rightarrow$ 2(special ability)

.If your path is $0 \rightarrow 2 \rightarrow 3$, the calculation of passing time is shown as below

country number	passing time
0	0
2	0 + 4 $\rightarrow$ 4(sum) $\rightarrow$ 2(special ability)
3	2 + 4 $\rightarrow$ 6(sum) $\rightarrow$ 6(special ability)

.2 Therefore, the procedure should return

Constraints

- $2 \leq N \leq 10^5$, $\sum N \leq 10^5$.
- $0 \leq M \leq \min\{10^5, \frac{N(N-1)}{2}\}$, $\sum M \leq 10^5$.
- $1 \leq K \leq 10^6$.
- $1 \leq H < N$
- $0 \leq x[i], y[i] < N, x[i] \neq y[i]$.
- $1 \leq c[i] \leq 10^9$.
- $arr[i] \in \{0, 1, 2\}$.
- It is guaranteed that every pair of countries is connected by at most one road.

Subtasks

1. (points 5): $N \leq 3$, $K \leq 30$.
2. (points 8): $M = N - 1$, $K \leq 30$, $arr[i] = 1$, you can travel from any countries to another via the M edges.
3. (points 13): $M = N - 1$, $K \leq 30$, $arr[i] \in 0, 1$, you can travel from any countries to another via the M edges.
4. (points 19): $M = N - 1$, $K \leq 30$, $x[i] = i$, $y[i] = i + 1$.
5. (points 7): $K \leq 30$, $arr[i] = 1$.
6. (points 16): $K \leq 30$, $arr[i] \in \{0, 1\}$.
7. (points 29): $K \leq 30$.
8. (points): No additional constraints 3.

Sample Grader

:The sample grader reads the input in the following format

- line 1: T

:For each of the following T test cases

- line 1: $N\ M\ K$
- line 2: H
- line 3: $arr[0]\ arr[1]\ arr[2] \cdots\ arr[N-1]$
- line $4+i (0 \le i \le M-1)$: $x[i]\ y[i]\ z[i]$

:The sample grader prints your answers in the following format

:For each test cases

- line 1: the return value of `solve`

repeatedly على نحو متكرر

special ability القدرة الخاصة

in case of being caught في حال جرى الإمساك بك

the divide-by-2 ability القدرة على القسمة على 2