**QUESTIONS**

**COMPANY: INFY DIGITAL**

**1.**

You have been given a string S of length N. The given string is a binary string which consists of only 0’s and ‘1’s. Ugliness of a string is defined as the decimal   number that this binary string represents.

**Example:**

* “101” represents 5.
* “0000” represents 0.
* “01010” represents 10.

 There are two types of operations that can be performed on the given string.

* Swap any two characters by paying a cost of A coins.
* Flip any character by paying a cost of B coins
* flipping a character means converting a ‘1’to a ‘0’or converting a ‘0’ to a ‘1’.

  Initially, you have been given coins equal to the value defined in CASH. Your task is to minimize the ugliness of the string by performing the above mentioned operations on it. Since the answer can be very large, return the answer modulo 10^9+7.

**Note:**

* You can perform an operation only if you have enough number of coins to perform it.
* After every operation the number of coins get deducted by the cost for that operation.

**Input Format**

* The first line contains an integer, N, denoting the number of character in the string
* The next line contains a string, S, denoting the the binary string
* The next line contains an integer, CASH, denoting the total number of coins present initially
* Next will contains an integer, A, denoting the cost to swap two characters.
* Then the next line contains an integer, B, denoting the cost to flip a character.

**Constraints**

* 1 <= N <= 10^5
* 1< len(S)<= 10^5
* 1<=CASH <=10^5
* 1<=A<=10^5
* 1<=B<=10^5

**Sample Input 1 :**

4  
1111  
7  
1  
2

**Sample Output 1 :**

  1

**Explanation:**

   3 flips can be used to create “0001” which represents 1.

**Sample Input 2:**

  6  
  111011  
  7  
  1  
  3

**Sample Output 2:**

  7

**Explanation:**

  First swap 0 with the most significant 1, then use flip twice first on index one and then on index two “111011”=>”0111111″=>”001111″=>”000111″ the value      represented is 7.

**Sample Input 3:**

  6  
  111011  
  7  
  3  
  2

**Sample Output 3:**

  3

**Explanation:**

 Flip the 3 most significant characters to get “000011” : the value represented by this string is 3.N

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2.

**Problem Statement :**

   Khaled has an array A of N elements. It is guaranteed that N is even. He wants to choose at most N/2 elements from array A. It is not necessary to choose             consecutive elements.  Khaled is interested in XOR of all the elements he chooses. Here, XOR denotes the bitwise XOR operation.

**For example:**

* If A=[2,4,6,8], then khaled can choose the subset [2,4,8] to achieve XOR=(2 XOR 4 XOR 8)=14.

   Khaled wants to maximize the XOR of all the elements he chooses. Your task is to help khaled to find the max XOR of a subset that he can achieve by choosing     at most N/2 elements?

**Input format:**

* The first line contains an integer, N, denoting the number of elements in A.
* Each line i of the N subsequent lines(where 0<=i<=N) contains an integer describing Ai.

**Constraints**

* 1<=N<=120
* 1<=A[i]<=10^6

**Sample Input 1**

   2  
   1  
   2  
**Sample Output 1**   
   2

**Explanation:**

   N=2,  A=[1,2] khaled can choose the subset[2]. The xor of the elements in the subset is 2. And the number of elements in the subset is 1 which is less than N/2.

**Sample Input 2**

   4  
   1  
   2  
   4   
   7

**Sample Output 2**

   7

**Explanation:**

   N=4,  A=[1,2,4,7] Khaled can choose the subset [7]. The xor of the elements in the subset is 7, and the number of elements in the subset is 1 which is less than       N/2.

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3.

**Problem Statement :**

    Wael is well-known for how much he loves the bitwise XOR operation, while kaito is well known for how much he loves to sum numbers, so their friend Resli          decided to make up a problem that would enjoy both of them. Resil wrote down an array A of length N, an integer K and he defined a new function called  Xor-        sum as follows

* Xor-sum(x)=(x XOR A[1])+(x XOR A[2])+(x XOR A[3])+…………..+(x XOR A[N])

    Can you find the integer x in the range [0,K] with the maximum Xor-sum (x) value?

    Print only the value.

**Input format**

* The first line contains integer N denoting the number of elements in A.
* The next line contains an integer, k, denoting the maximum value of x.
* Each line i of the N subsequent lines(where 0<=i<=N) contains an integer describing Ai.

**Constraints**

* 1<=N<=10^5
* 0<=K<=10^9
* 0<=A[i]<=10^9

**Sample Input 1**

   1  
   0  
   989898

**Sample Output 1**

   989898

**Explanation:**

   Xor\_sum(0)=(0^989898)=989898

**Sample Input 2**

   3  
   7  
   1  
   6  
   3

**Sample Output 2**

   14

**Explanation**

    Xor\_sum(4)=(4^1)+(4^6)+(4^3)=14.

**Sample Input 3**

     4  
     9  
     7  
    4  
    0  
    3

**Sample Output 3**

   46

**Explanation:**

   Xor\_sum(8)=(8^7)+(8^4) +(8^0)+(8^3)=46.

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4.

**Problem Statement :**

    One of the first lessons IT students learn is the representation of natural numbers in the binary number system (base 2) This system uses only two digits, 0            and 1. In everyday life we use for convenience the decimal system (base 10) which uses ten digits, from 0 to 9. In general, we could use any numbering  
    system .

Computer scientists often use systems based on 8 or 16. The numbering system based on K uses K digits with a value from 0 to K-1. Suppose a natural                 number M is given, written in the decimal system To convert it to the corresponding writing in the system based on K, we successively divide M by K until we         reach a quotient that is less than K

   The representation of M in the system based on K is formed by the final quotient (as first digit) and is followed by the remainder of the previous divisions

**For example :**

* If M=122 and K=8, 122 in base 10= 172 in base 8 This means that the number
* In decimal system = 172 in octal system.
* 172 in base 8 = 1\*8^2 + 7\*8 + 2 = 122

   You made the following observation in applying the above rule of converting natural numbers to another numbering system

* In some cases in the new representation all the digits of the number are the same. For example 63 in base 10= 333 in base 4

   Given a number M in its decimal representation, your task is find the minimum base B such that in the representation of M at base B all digits are the same.

**Input Format**

* The first line contains an integer, M, denoting the number given

**Constraints**

* 1 <= M = 10^12

**Sample Input 1 :**

     41

**Sample Output 1 :**

    40

**Explanation :**

    Here 41 in base 40. will be 11 so it has all digits the same, and there is no smaller base satisfying the requirements

**Sample Input 2 :**

    34430

**Sample Output 2 :**

   312

**Explanation :**

   Here 34430 in base 312 will have all digits the same and there is no smaller base satisfying the requirements

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5.

Andy wants to go on a vacation to de-stress himself. Therefore he decides to take a trip to an island. It is given that he has as many consecutive days as           possible to rest, but he can only make one trip to the island. Suppose that the days are numbered from 1 to N. Andy has M obligations in his schedule, which     he has already undertaken and which correspond to some specific days. This means that ith obligation is scheduled for day Di. Andy is willing to cancel at         most k of his obligations in order to take more holidays.

    Your task is to find out the maximum days of vacation Andy can take by canceling at most K of his obligations.

**Input Format**

* The first line contains an integer N, denoting the total number of days
* The next line contains an integer M denoting the total number of obligations.
* The next line contains an integer K denoting the largest number of obligations he could cancel
* Each line i of the M subsequent lines (where 0<=i<=M) contains an integer describing Di.

**Constraints**

* 1<=N<=10^6
* 1<=M<=2\*10^6
* 1<=K<=2\*10^6
* 1<=D[i]<=10^6

**Sample Input 1:**

   10  
    5  
    2  
    6  
    9  
     3  
     2  
     7

**Sample Output 1 :**

    5

**Explanation:**

    Here he could cancel his 3rd and 4th obligation which makes vacation length 5.

**Sample input 2:**

    7  
    2  
    0  
    3  
    4

**Sample Output 2:**

     3

**Explanation:**

    Here he could not cancel any obligation since K=0, so the vacation length is 3.

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6. Write a Program to Find a Specific Pair in a Matrix

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7. Write a Program to find out the Spiral Traversal of a Matrix.

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8. Write a Program to Convert Octal Number to Decimal Number.

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9.

### Biggest Meatball

**Problem Statement –**Bhojon is a restaurant company and has started a new wing in a city. They have every type of cook except the meatball artist. They had fired their last cook because the sale of meatballs in their restaurant is really great, and they can’t afford to make meatballs again and again every time their stock gets empty. They have arranged a hiring program, where you can apply with their meatball.  
They will add the meatball in their seekh (a queue) and everytime they cut the meatball they take it and cut it on the day’s quantity and then re-add the meatball in the seekh. You are the hiring manager there and you are going to say who is gonna be hired.

Day’s quantity means, on that very day the company sells only that kg of meatballs to every packet.

If someone has less than a day’s quantity, it will be counted as a sell.

**Function Description:**

* Complete the function with the following parameters:

**Parameters:**

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| N | Integer | How many people are participating in the hiring process. |
| D | Integer | Day’s quantity, how many grams of meatball is being sold    to every packet. |
| Array[ ] | Integer array | Array of integers, the weight of meatballs everyone came with. |

**Return:**

* The ith person whose meat is served at last.

**Constraints:**

* 1 <= N <= 10^3
* 1 <= D <= 10^3
* 1 <= Array[i] <= 10^3

**Input Format:**

* First line contains N.
* Second line contains D.
* After that N lines contain The ith person’s meatball weight.

**Output Format:**The 1 based index of the man whose meatball is served at the last.

**Sample Input 1:**

4

2

[7 8 9 3]

**Sample Output 1:**

3

**Explanation:**

The seekh or meatball queue has [7 8 9 3] this distribution. At the first serving they will cut 2 kgs of meatball from the first meatball and add it to the last of the seekh, so after 1st time it is:

[8 9 3 5]

Then, it is: [9 3 5 6],  [3 5 6 7], [5 6 7 1], [6 7 1 3], [7 1 3 4], [1 3 4 5], [3 4 5], [4 5 1], [5 1 2], [1 2 3], [2 3], [3], [1], [0]

So the last served meatball belongs to the 3rd person.

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10.

### Self Sufficient

**Problem Statement –**Abhijeet is one of those students who tries to get his own money by part time jobs in various places to fill up the expenses for buying books. He is not placed in one place, so what he does, he tries to allocate how much the book he needs will cost, and then work to earn that much money only. He works and then buys the book respectively. Sometimes he gets more money than he needs so the money is saved for the next book. Sometimes he doesn’t. In that time, if he has stored money from previous books, he can afford it, otherwise he needs money from his parents.

Now His parents go to work and he can’t contact them amid a day. You are his friend, and you have to find how much money minimum he can borrow from his parents so that he can buy all the books.

He can Buy the book in any order.

**Function Description:**

Complete the function with the following parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| N | Integer | How many Books he has to buy that day. |
| EarnArray[ ] | Integer array | Array of his earnings for the ith book |
| CostArray[ ] | Integer array | Array of the actual cost of the ith book. |

**Constraints:**

* 1 <= N <= 10^3
* 1 <= EarnArray[i] <= 10^3
* 1 <=  CostArray[i] <= 10^3

**Input Format:**

* First line contains N.
* Second N lines contain The ith earning for the ith book.
* After that N lines contain The cost of the ith book.

**Output Format:**The minimum money he needs to cover the total expense.

**Sample Input 1:**

3

[3 4 2]

[5 3 4]

**Sample Output 1:**

3

**Explanation:**

At first he buys the 2nd book, which costs 3 rupees, so he saves 1 rupee. Then he buys the 1st book, that takes 2 rupees more. So he spends his stored 1 rupee and hence he needs 1 rupee more. Then he buys the last book.

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11.

### Parallel Columbus

**Problem Statement –**Nobel Prize-winning Austrian-Irish physicist Erwin Schrödinger developed a machine and brought as many Christopher Columbus from as many parallel universes he could. Actually he was quite amused by the fact that Columbus tried to find India and got America. He planned to dig it further.

Though totally for research purposes, he made a grid of size n X m, and planted some people of America in a position (x,y) [in 1 based indexing of the grid], and then planted you with some of your friends in the (n,m) position of the grid. Now he gathered all the Columbus in 1,1 positions and started a race.

Given the values for n, m, x, y, you have to tell how many different Columbus(s) together will explore you as India for the first time.

Remember, the Columbus who will reach to the people of America, will be thinking that as India and hence wont come further.

**Function Description:**

Complete the markgame function in the editor below. It has the following parameter(s):

**Parameters**:

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| n | Integer | The number of rows in the grid. |
| m | Integer | The number of columns in the grid. |
| x | Integer | The American cell’s Row. |
| y | Integer | The American cell’s Column. |

**Constraints:**

* 1 <= n <= 10^2
* 1 <= m <= 10^2
* 1 <= x <= n
* 1 <= y <= m

**Input Format:**

* The first line contains an integer, n, denoting the number of rows in the grid.
* The next line contains an integer m, denoting the number of columns in the grid.
* The next line contains an integer, x, denoting the American cell’s row.
* The next line contains an integer, y, denoting the American cell’s column.

**Sample Cases**

**Sample Input 1**

2

2

2

1

**Sample Output 1**

1

**Explanation**

The only way possible is (1,1) ->(2,1) -> (2,2), so the answer is 1.

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12.

### Amusement park

**Problem Statement –**Aashay loves to go to WONDERLA , an amusement park. They are offering students who can code well with some discount. Our task is to reduce the cost of the ticket as low as possible.

The cost of tickets can be removed by removing the digits from the price given. They will give some k turns to remove the digits from the price of the ticket. Your task is to help Aashay in coding a program that can help him to reduce the cost of a ticket by removing the digits from its price and getting the maximum possible discount.

**Note –**You cannot make the cost of a ticket zero. For eg -: If the cost of a ticket is 100, and you have 2 turns to reduce the price, the final price will be 1 and not zero.

**Constraints:**

* 1 <= number of tickets <= 10^5
* 1 <= K <= number of tickets

**Input Format for Custom Testing:**

* The first line contains a string,Tickets, denoting the given cost of each ticket.
* The next line contains an integer, K, denoting the number of tickets that is to be removed.

**Sample Cases:**

* **Sample Input 1**203  
  3
* **Sample Output 1**0

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13.

### HR issues

**Problem statement -:**

Shovon is an HR in a renowned company and he is assigning people to work. Now he is assigning people work in a fashion where if he assigns somework a work of cost 2, the next person will be strictly getting a job with cost equal or more than 2. Given that Shovon’s company has infinite work and a number of employees, how many distributions can be possible. The cost of jobs can go 0 to 9.

**Function Description:**

Complete the special\_numbers function in the editor below. It has the following parameter(s):

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| N | Integer | The number of depts. |
| arr[ ] | Integer array | The number of  employees in each dept.. |

**Return**: The function must return an INTEGER denoting the sum of answers for all distinct distributions.

**Constraints:**

* 1 <= n <= 100
* 1 <= arr[i] <= 200

**Sample Cases:**

* **Sample Input 1**2  
  4  
  1
* **Sample Output 1**725
* **Description**The ans if m = 1 is 10, which is all numbers from 0 to 9  
  The ans for m = 2 is 55  
  The answer for m = 3 is 220  
  The answer for m = 4 is 715  
  So fun(4) + fun(1) = 725

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14.

### Airport authority

**Problem Statement -:**

In an airport , the Airport  authority decides to charge some minimum amount to the passengers who are carrying luggage with them. They set a threshold weight value, say T, if the luggage exceeds the weight threshold you should pay double the base amount. If it is less than or equal to threshold then you have to pay $1.

**Function Description:**

Complete the weightMachine function in the editor below. It has the following parameter(s):

Parameters:

|  |  |  |
| --- | --- | --- |
| **Name** | **Type** | **Description** |
| N | Integer | number of luggage |
| T | Integer | weight of each luggage |
| weights[ ] | Integer array | threshold weight |

**Returns**: The function must return an INTEGER denoting the required amount to be paid.

**Constraints:**

* 1 <= N <= 10^5
* 1 <= weights[i] <= 10^5
* 1 <= T <= 10^5

**Input Format for Custom Testing:**

* The first line contains an integer, N, denoting the number of luggages.
* Each line i of the N subsequent lines (where 0 <= i <n) contains an integer describing weight of ith luggage.
* The next line contains an integer, T, denoting the threshold weight of the boundary wall.

**Sample Cases:**

* **Sample Input 1**4  
  1  
  2  
  3  
  4  
  3
* **Sample Output 1**5
* **Explanation**:  
  Here all weights are less than threshold weight except the luggage with weight 4 (at index 3) so all pays base fare and it pays double fare.

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15.

### Find the homeless

**Problem Statement -:**There are N Homeless people in the community and N houses in the community. It will be given in the array (people) , height of the person and in the array house capacity of the house is given.

Government decided to give homes for people on the basis of following conditions:

* Priority is given for the people from left to right of the array
* Each person is allotted to a house if and only if the capacity of house is greater than or equal to persons height
* Nearby empty Houses are alloted to the person( starting from extreme left)

You need to find the number of homeless people who have not allotted any home if the government follows the above conditions.So that government will have an idea for how many people they need to allot home for next time.

**Constraints:**

* 1 <= N <= 10^3
* 1 <= people[i] <= 10^5
* 1 <= house[i] <= 10^5

**Input Format for Custom Testing:**

* The first line contains an integer, N, denoting the number of  people and number of houses.
* Each line i of the N subsequent lines (where 0 <= i <= N) contains an integer describing peoplei.
* Each line i of the N subsequent lines (where 0 <= i <= N) contains an integer describing housei.

**Sample Test Cases**

* **Sample Input 1**3    
  4  
  2  
  7  
  3  
  5  
  10
* **Sample Output 1**0
* **Explanation**people=[4,2,7]  
  house=[3,5,10]  
  People[0] has more priority , from left to right order in houses 5 is the nearest one which fits for people[0]  
  people[1]=2 will fit in 3 which is nearer from left  
  people[2]=7 will fit in remaining house of capacity of 10  
  So no homeless people left so return 0
* **Sample Input 2**3  
  3  
  8  
  5  
  1  
  9  
  4
* **Sample Output 2**2
* **Explanation**people=[3,8,5]  
  house=[1,9,4]  
  people[0]=3 can fit in 9 which is nearest from left in array house  
  people[1]=8  cannot fit in any home which is left (i.e, 1 and 4)  
  people[2]=5 cannot fit in any home which is left (i.e, 1 and 4)  
  So return 2,which is number of homeless people