Problem A. Bitqoins

Time limit: 1 second
Memory limit: 256 megabytes

Miss M lives on the planet Bitaqulandia, where the most popular currency is the bitqoin. Recently, Miss M held a mini-competition for friends, where each winner receives exactly three bitqoins.

It is known that in Miss M's competition, the prize fund is n bitqoins, m people won, and each winner receives exactly three bitqoins.

Determine how many bitqoins will remain with Miss M if she gives three bitqoins to each winner. It is known that Miss M has enough bitqoins.

Input

The first line contains one integer n ($3 \leq n \leq 100$) — the number of bitqoins.

The second line contains one integer m ($1 \leq m \leq 100$) — the number of Miss M's friends who won in the competition.

It is guaranteed that Miss M will have enough bitqoins to distribute to her winning friends.

Output

Print a single integer — the number of bitqoins that will remain with Miss M after she distributes them to the winners.

Example

standard input	standard output
10 2	4

Note

Miss M had two friends win, she will give three bitqoins to each of them. In total, she will give away six, so only four bitqoins will remain.

Problem B. Miss M and the Flowers

Time limit: 1 second
Memory limit: 256 megabytes

Miss M has arranged one of her flower beds in the shape of an $n \times m$ chessboard, with each cell containing one flower.

She is planning to visit Sonichka and decided to pick a bouquet of flowers from the flower bed for her. But since Miss M is in a hurry, she has entrusted this task to a special robot.

The robot, always starting from the upper left corner, moves across the flower bed to the lower right corner (it can only move either down or to the right) and **must collect all the flowers on its path**. With each pass through the flower bed, the robot must collect at least one flower. After each pass, the robot returns to the starting position - the upper left corner.

Miss M does not care how optimally the robot performs its task, so she asks you to calculate the maximum number of passes through the flower beds the robot will need to pick absolutely all the flowers.

Input

The first line contains one integer n ($1 \le n \le 1\,000$).

The second line contains one integer m ($1 \le m \le 1\,000$).

Output

Print a single integer — the answer to the problem.

Example

standard input	standard output
3 4	7

Note

The algorithm for collecting flowers in the maximum number of passes will be as follows:

1. On the first pass through the flower bed, the robot will collect exactly 6 flowers, as it visits 6 cells (marked in red in the pictures).
2. Each subsequent pass will go through exactly one new cell, so the robot will collect the next 6 flowers in 6 passes.

In total, $1 + 6 = 7$ passes.

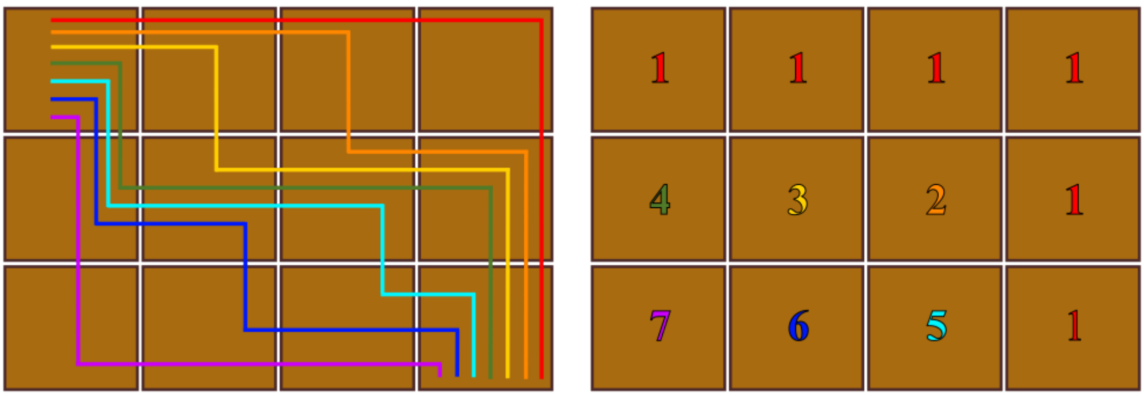


Diagram of the robot's paths from the first example in the problem statement.

Problem C. Check the Calendar!

Time limit: 1 second
Memory limit: 256 megabytes

Miss M and Mister N live on the planet Bitaculandia, where a year consists of 12 months, and each month — of 30 days. They recently discovered that some people could have been born on the same day, even though their birthdates are different. This is possible due to the change from the Bytulian calendar to the Bitulian calendar. All countries of Bitaculandia switched from one calendar to the other in very different years, so some birthdates of different residents who were born on the same day may differ. For example, the date of March 15th in the Bytulian calendar corresponds to March 28 in the Bitulian calendar, that is, a difference of 13 days forward.

Now Miss M and Mister N want to find out if they were not born on the same day if Mister N's birthdate is recorded according to the Bytulian calendar, and Miss M's — according to the Bitulian calendar. Help them with this!

Input

The first line contains two integers d_1 and m_1 ($1 \le d_1 \le 30$, $1 \le m_1 \le 12$) — the day and month according to the Bytulian calendar.

The second line contains two integers d_2 and m_2 ($1 \le d_2 \le 30$, $1 \le m_2 \le 12$) — the day and month according to the Bitulian calendar.

It is guaranteed that the date according to the Bytulian calendar is not later than the date according to the Bitulian calendar.

Output

Print "`Same birthday!`", if both dates denote the same day, and "`Not the same`" otherwise.

Examples

standard input	standard output
26 11 9 12	Same birthday!
1 1 20 12	Not the same

Problem D. Relocation

Time limit: 1 second
Memory limit: 256 megabytes

Miss M lives on the planet Bitaqulandia and has decided to move from the country of Derzhprodiya to Tobolyandia.

For now, she has decided to move her **four** most important items. To transport them, she has chosen to use **two** boxes, where she will place all the items. It is known that the i-th item weighs w_i kilograms and is located in the t_i-th box.

She will need to move the boxes one at a time, so she would very much like the boxes to not be too heavy. That is, she wants the maximum possible weight of a box to be as small as possible. Since she doesn't have much time, she can only move one item from one box to another.

Help her make the move easier and find out which item needs to be moved!

Input

The first line contains four integers w_1, w_2, w_3, w_4 ($1 \le w_i \le 10^6$) — the weights of each of the four items.

The second line contains four integers t_1, t_2, t_3, t_4 ($1 \le t_i \le 2$) — the box numbers in which the corresponding items are located.

Output

Print a single integer p ($1 \le p \le 4$) — the number of the item that needs to be moved to another box.

If there are several correct answers, you can print any of them.

If it is optimal to not change anything, then print a single integer "`-1`".

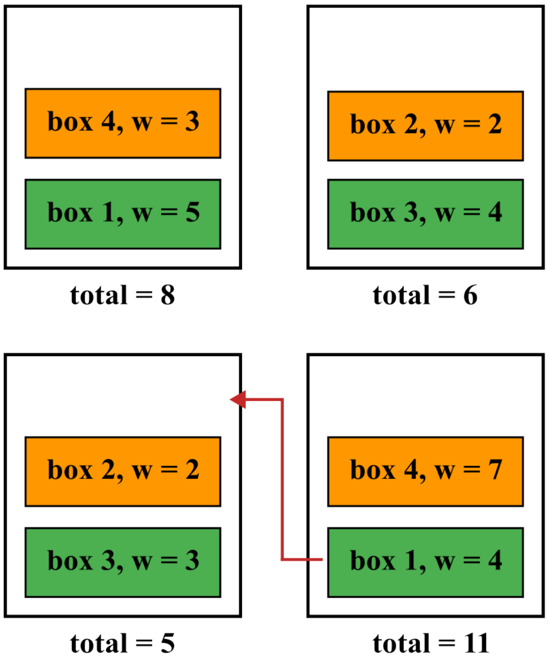
Examples

standard input	standard output
5 2 4 3 1 2 2 1	-1
4 2 3 7 2 1 1 2	1

Note

To achieve the minimum maximum possible weight after moving one item from one box to another, in the second example there is only one option. In the initial distribution of items across the boxes, the weights of the boxes are 5 and 11. Consider all the options for moving items between boxes:

- If you move item number 1 weighing 4 from the second box to the first, then the weights of the boxes will be $4 + 2 + 3$ and 7, $\max = 9$.
- If you move item number 2 weighing 2 from the first box to the second, then the weights of the boxes will be $4 + 7 + 2$ and 3, $\max = 13$.
- If you move item number 3 weighing 3 from the first box to the second, then the weights of the boxes will be $4 + 7 + 3$ and 2, $\max = 14$.
- If you move item number 4 weighing 7 from the second box to the first, then the weights of the boxes will be $2 + 3 + 7$ and 4, $\max = 12$.



The first and second example from the problem statement.

Problem E. Sonichka's Birthday

Time limit: 1 second
Memory limit: 256 megabytes

Sonichka is Miss M's best friend. She has been admitted to the best university in the distant and progressive country of Noteandia. Unfortunately, Miss M misses her friend very much, so she decided to make a gift for Sonichka while she is studying in another country.

Today is Sonichka's birthday, but since Sonichka will return a bit later, and Miss M has some time, she decided to make a gift.

Miss M decided that she wants to learn cross-stitching and make ornaments on a vishivanka, which will be a gift for Sonichka to give when she returns, but she doesn't know where to start at all. So, she came up with the idea to write a program that will create an ornament of the required width and length, which she can then use as an example for embroidery.

An embroidered shirt is a rectangle $n \times m$. The ornaments are two rays that come out from the upper corners of the shirt and have angles of $45°$. The ray reflects when it touches the vertical edge. When the ray touches the bottom edge, it disappears. For a visual example, you can look at the examples below.

Help Miss M learn cross-stitching and give a beautiful embroidered shirt to the lovely Sonichka for her birthday by writing such a program that, given the width n and length m, will output an example of the ornament.

Input

The first line contains two integers n and m ($3 \le n, m \le 1\,000$) — the height and width, respectively.

Output

Output the ornament of size $n \times m$.

Examples

standard input	standard output

`6 4`	`x..x`
	`.xx.`
	`.xx.`
	`x..x`
	`.xx.`
	`.xx.`

`12 5`	`x...x`
	`.x.x.`
	`..x..`
	`.x.x.`
	`x...x`
	`.x.x.`
	`..x..`
	`.x.x.`
	`x...x`
	`.x.x.`
	`..x..`
	`.x.x.`

`21 12`	`x..........x`
	`.x........x.`
	`..x......x..`
	`...x....x...`
	`....x..x....`
	`.....xx.....`
	`.....xx.....`
	`....x..x....`
	`...x....x...`
	`..x......x..`
	`.x........x.`
	`x..........x`
	`.x........x.`
	`..x......x..`
	`...x....x...`
	`....x..x....`
	`.....xx.....`
	`.....xx.....`
	`....x..x....`
	`...x....x...`
	`..x......x..`

Problem F. Championship Gifts

Time limit: 0.5 seconds
Memory limit: 256 megabytes

On the planet Bitaculandia, there is an annual prestigious competition hosted by Miss M — an international team championship.

Residents from all countries of Bitaculandia participate in this competition. The championship also involves solving problems with very interesting legends, like this one, but in teams. The best teams, according to the championship results, receive prizes.

Miss M has finally received the long-awaited gifts for the championship, which need to be sent to the winners. She realized that there are many gifts. And while everything is clear with mugs and packets, there was a problem with T-shirts. Each team has three participants, and each of them ordered a T-shirt of one of n colors and one of m sizes. But Miss M is not sure that all the winners' wishes will be fulfilled...

Therefore, Miss M developed an algorithm according to which she will collect gifts for the teams.

1. If a T-shirt of the required size and color is still available, she takes it.
2. Otherwise, she looks for a T-shirt of the same size but a different color. If there are several, then the color with the minimum number.
3. Otherwise, she looks at T-shirts of the next larger size, but with the priority of the color indicated by the team at the beginning. If there are no T-shirts with the prioritized color, but there are several others, we choose the T-shirt with the minimum color number.
4. Otherwise, we repeat the process of the previous step among T-shirts of the next larger size. We continue this process until such sizes are available.
5. If none of the remaining T-shirts are suitable, then the T-shirt indicated by the team is recorded as absent.

Miss M decided that she needs to send back to the warehouse the T-shirts that turned out to be superfluous and order more of the T-shirts that she recorded as absent, to satisfy all the participants of the championship. To avoid sorting all the T-shirts by hand, Miss M asks you to write a program that:

1. Outputs which specific T-shirts turned out to be superfluous in the format of a table of size $n \times m$, where l_{ij} — the number of T-shirts of the i-th color and j-th size that remained after she distributed T-shirts to all participants.
2. Outputs which T-shirts need to be ordered in the format of a table of size $n \times m$, where n_{ij} — the number of T-shirts of the i-th color and j-th size that participants asked for, but the organizers could not give any T-shirts.

Input

The first line contains two integers n and m ($1 \le n \le 100, 1 \le m \le 6$) — the number of different colors and sizes of T-shirts, respectively.

The second line contains m elements — the sizes of T-shirts delivered to Miss M. Sizes are — `XS`, `S`, `M`, `L`, `XL`, `2XL`. It is guaranteed that the sizes are given in increasing order.

Each of the following n lines contains m integers $t_{i1}, t_{i2}, \ldots, t_{im}$ ($0 \le t_{ij} \le 5 \cdot 10^3$) — the number of T-shirts of the i-th color and j-th size.

The next line contains one integer k ($1 \le k \le 10^5$) — the number of winners.

Each of the following k lines contains an integer c_i ($1 \le c_i \le n$) and a character s_i — the color and size of each T-shirt, respectively. It is guaranteed that s_i is one of the m sizes that were specified.

The winners' requests must be processed exactly in the order specified.

Output

In each of the following n lines, output m integers $l_{i1}, l_{i2}, \ldots, l_{im}$ — the number of T-shirts of the i-th color and j-th size that remained.

In each of the following n lines, output m integers $n_{i1}, n_{i2}, \ldots, n_{im}$ — the number of T-shirts of the i-th color and j-th size that need to be purchased.

Example

standard input	standard output
2 3 S M XL 1 3 0 3 0 3 9 1 S 2 XL 1 M 2 XL 1 M 2 M 1 M 2 S 1 XL	0 0 0 2 0 0 0 0 1 0 0 0

Note

Suppose we have white T-shirts (index one) and black T-shirts (index two). So, we have one white T-shirt of size `S`, and also three white T-shirts of size `M`. There are three black T-shirts of size `S`, and also three black T-shirts of size `XL`.

Consider each winner:

1. The winner needs a white T-shirt of size `S`, we have one, so we give it to him. This was the last such T-shirt.
2. The winner needs a black T-shirt of size `XL`, we have one, so we give it to him. We still have two such T-shirts left.
3. The winner needs a white T-shirt of size `M`, we have one, so we give it to him. We still have two such T-shirts left.
4. The winner needs a black T-shirt of size `XL`, we have one, so we give it to him. We still have one such T-shirt left.
5. The winner needs a white T-shirt of size `M`, we have one, so we give it to him. We still have one such T-shirt left.
6. The winner needs a black T-shirt of size `M`, we don't have one. However, we have a white T-shirt of size `M`, so we give it to him. We no longer have any white T-shirts of size `M` left.
7. The winner needs a white T-shirt of size `M`, we don't have one. We also don't have a black T-shirt of size `M`, so we can't give the winner a T-shirt of size `M`. Therefore, we look at the next size — `XL`. The winner wants to get a white T-shirt, but we also don't have such a T-shirt of size `XL`. So we give him a black T-shirt of size `XL`. This was the last such T-shirt.
8. The winner needs a black T-shirt of size `S`, we have one, so we give it to him. We still have one such T-shirt left.

9. The winner needs a white T-shirt of size XL, but we don't have either a white T-shirt of that size or a black one. Therefore, since we don't have T-shirts of a larger size, we can't give the participant the T-shirt he indicated, we record it on the list.

We are left with two black T-shirts of size S.

We could not give out one white T-shirt of size XL.

Problem G. Who Advanced?

Time limit: 1 second
Memory limit: 256 megabytes

Many residents of Bitaculandia participate in the stages of international programming olympiads. There are seven such olympiads held in Bitaculandia:

1. `IOI` - International Olympiad in Informatics
2. `CEOI` - Central-Eventora Olympiad in Informatics
3. `EGOI` - Eventora Girls Olympiad in Informatics
4. `EJOI` - Eventora Junior Olympiad in Informatics
5. `BaltOI` - Balticodian Olympiad in Informatics
6. `BalkOI` - Balkolian Olympiad in Informatics
7. `JBOI` - Junior Balkolian Olympiad in Informatics

Miss M is responsible for organizing various stages of olympiads, as well as selections (training camps) for all seven international stages. After the last selection round, teams of four to six people are formed for all seven olympiads. However, only those participants who meet the criteria for participation in the olympiad should be sent to each competition. Here is a list of algorithms for determining the participants of the teams for the olympiads:

1. `IOI` - Top 4 participants based on the total scores from all selection rounds.
2. `CEOI` - Top 4 participants based on the total scores from all selection rounds.
3. `EGOI` - Top 4 female participants based on the total scores from all selection rounds.
4. `EJOI` - Top 4 participants at most 15 years old based on the total scores from all selection rounds.
5. `BaltOI` - Top 6 participants based on the total scores from all selection rounds.
6. `BalkOI` - Top 4 participants who are not in 11th grade based on the total scores from all selection rounds.
7. `JBOI` - Top 4 participants who are not in 11th or 10th grade based on the total scores from all selection rounds.

If there are fewer participants than the required number, it means that the team will consist of fewer people. For example, if you need to determine the team for `EGOI` and there are only two girls, it means that the team will consist of only two participants, not four.

Since there are many participants and many olympiads, and the results are desired immediately after the competition ends, Miss M asks to write a program that, based on the results and information about the participants, provides the composition of the teams for the international stages of the olympiads.

Input

The first line contains an integer n ($1 \le n \le 10^4$) — the number of olympiad participants.

Each of the following n lines contains information about the olympiad participants:

- id — unique participant number ($10^6 \le id < 10^7$);
- $gender$ — participant's gender (`male` — male, `female` — female);

- $grade$ — participant's grade level ($1 \le grade \le 11$);
- age — participant's age ($10 \le age \le 20$);
- $score$ — the number of points participants have from all selection rounds ($0 \le score \le 10^8$).

It is guaranteed that all id and $score$ of participants are different.

The next line contains an integer m ($1 \le m \le 7$) — the number of international olympiads for which Miss M wants to know the composition of the participant teams.

The following m lines contain the names of the international olympiads for which the composition of the participant teams needs to be output. Possible olympiads: `IOI`, `CEOI`, `EGOI`, `EJOI`, `BaltOI`, `BalkOI`, `JBOI`. It is guaranteed that all olympiads are different.

Output

Output m lines, containing the names of the international olympiads, in the same order as specified in the input data, and the id of participants who are part of the teams, in the format of **increasing** participant id number.

Scoring

In this problem, there are tests where $m = 1$ for each possible olympiad. That is, if you can only solve the problem for a certain olympiad, you are guaranteed to receive points.

Example

<table>
<tr><th>standard input</th><th>standard output</th></tr>
<tr><td><pre>10
1000001 female 10 16 400
1000002 male 10 17 500
1000003 male 11 17 505
1000004 male 11 16 405
1000005 female 11 17 450
1000006 female 10 15 480
1000007 male 9 15 445
1000008 male 6 12 350
1000009 male 8 13 399
1000010 male 10 16 430
3
IOI
EGOI
BaltOI</pre></td><td><pre>IOI
1000002
1000003
1000005
1000006

EGOI
1000001
1000005
1000006

BaltOI
1000002
1000003
1000005
1000006
1000007
1000010</pre></td></tr>
</table>

Note

All participants can take part in `IOI`, the results table will look like this:

1. 1000003 — 505 points
2. 1000002 — 500 points
3. 1000006 — 480 points

4. 1000005 — 450 points
5. 1000007 — 445 points
6. 1000010 — 430 points
7. 1000004 — 405 points
8. 1000001 — 400 points
9. 1000009 — 399 points
10. 1000008 — 350 points

The participants who will go to the olympiad are 1000003, 1000002, 1000006, 1000005.

Only girls can participate in `EGOI`, the results table will look like this:

1. 1000006 — 480 points
2. 1000005 — 450 points
3. 1000001 — 400 points

The participants who will go to the olympiad are 1000006, 1000005, 1000001.

All participants can take part in `BaltOI`, the results table will look the same as for `IOI`. The same participants who will go to `IOI` will also go to `BaltOI`, as well as 1000007 and 1000010.

Problem H. Choose Colors

Time limit: 1.5 seconds
Memory limit: 256 megabytes

Miss M not only enjoys inventing interesting legends for programming problems but also loves painting, especially using harmonious color combinations, such as complementary colors from the color wheel. However, this time she decided to choose colors for her painting differently.

Miss M took n color wheels (you can look at the note section to see what a color wheel is), each with different shades consisting of $(a_i + 1)$ colors, and has already selected one initial color on each wheel, marking it as used. Then, she will choose each subsequent color using the following algorithm:

1. Find the longest sequence among all the color wheels of unmarked colors; if there are several, choose any.
2. If the length of such a sequence is odd, take the color exactly in the middle and mark it as used.
3. If the length of such a sequence is even, take one of the two middle colors and mark it as used.

Miss M wants to choose m more colors, and she is also interested in what the maximum length of the sequence of unmarked colors will be before she selects the $(m + n)$-th color.

Input

The first line contains two integers n and m ($1 \le n \le 100$, $1 \le m \le 10^{18}$) — the number of color wheels and the number of colors Miss M wants to take additionally (i.e., not counting the first marked colors on each wheel).

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 10^{18}$).

It is guaranteed that m is no more than the sum of all a_i.

Output

Print a single integer — the maximum length of the sequence of unmarked colors before Miss M selects the $(m + n)$-th color.

Scoring

If your solution works correctly for $n = 1$ and $a_1 \le 100$, it will score at least 25 points.

If your solution works correctly for $n = 1$ and $a_1 \le 10^6$, it will score at least 50 points.

If your solution works correctly for $n = 1$, it will score at least 75 points.

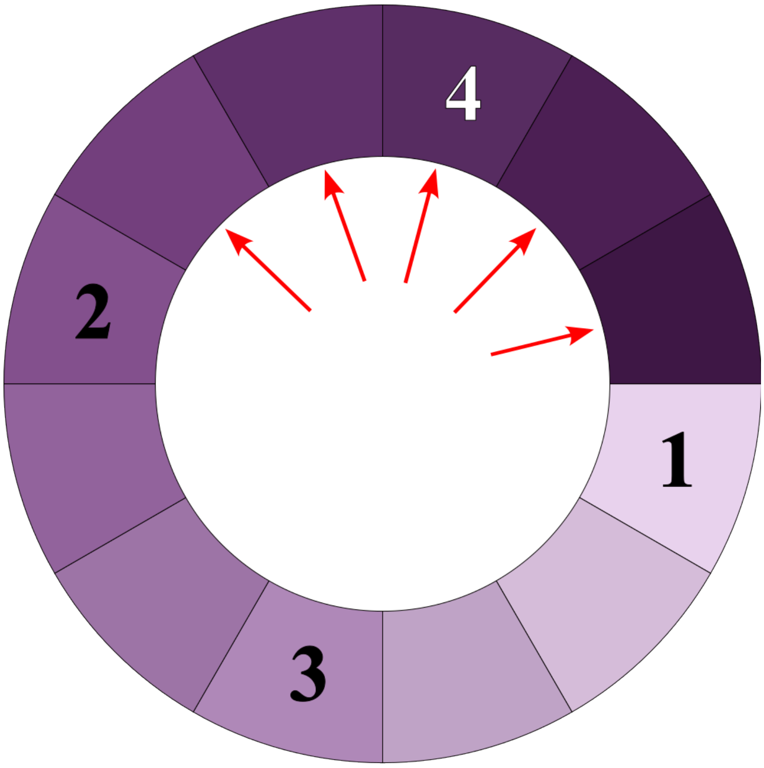
Examples

standard input	standard output
1 1 11	11
1 3 11	5
1 5 11	2
1 109 1033	15
3 1145 4034 5912 9134	22

Note

Explanation for the second example: We are given one color wheel containing 12 colors. Miss M has already chosen one color from the wheel (marked as number 1 in the picture). Now she wants to choose 3 more colors. Therefore, the sequence of her actions is as follows:

1. The maximum length of the sequence of unmarked colors is 11. Therefore, we choose the color that will be in the middle and mark it with the number 2.
2. Now we have sequences of 5 and 5 unmarked colors; we choose any and in the middle of the sequence, we select a color and mark it with the number 3.
3. Among the sequences — 2, 2, and 5 we choose 5 — this is the maximum length of the sequence of unmarked colors before Miss M selects the 4-th color.



The color wheel from the second example in the problem statement.