Problem A. The first day of school

Time limit: 1 second
Memory limit: 64 MB

Vasya is a young and very promising android. Today is his first day at University. Vasya has very carefully studied the list of all courses on the wall near the Dean's office and has chosen the ones to attend. Now he wants to write down his own week timetable. Help him do this.

Input

The first line contains an integer n — the number of courses Vasya is going to attend ($1 \le n \le 12$). After that the courses are listed, each is described in two lines.

The first line of a course description contains its name. The name of the course may consist of up to five words, which are divided by exactly one space (there are no spaces before the first word and after the last one). The words consist of capital and lowercase Latin letters. The length of every word is within the range from 1 to 10.

The second line of a course description contains the day of week and the number of a lesson, when it takes place. The day of week may take one of the three values: `Tuesday`, `Thursday` и `Saturday`. The number of a lesson — is an integer from 1 to 4. There are no two courses, Vasya has chosen, taking place at the same time.

Output

Output the timetable as a table of the size 4×3. The columns of the table should correspond to the three academic days: the first column — to Tuesday, the second — to Thursday, the third — to Saturday. The rows should correspond to the four classes. The width of each column should be equal to 10 characters. The height of the row of the table equals to the height of the highest of its cells. If all the cells in the row are empty then the height of the row should be equal 1 character. If some word doesn't find room in the current line, it should be placed in the next line. The text in the cell should be aligned to top and left borders. Make the table itself using characters - (ASCII 45), + (ASCII 43) and | (ASCII 124).

Example

test	answer
9 Physics Thursday 3 Maths Tuesday 1 Chemistry Thursday 1 Physical education Saturday 2 Astronomy Saturday 4 Urban geography Tuesday 4 History Saturday 1 Modeling Thursday 2 Biology Thursday 4	+----------+----------+----------+ |Maths |Chemistry |History | +----------+----------+----------+ | |Modeling |Physical | | | |education | +----------+----------+----------+ | |Physics | | +----------+----------+----------+ |Urban |Biology |Astronomy | |geography | | | +----------+----------+----------+

Problem B. Maths

Time limit: 1 second
Memory limit: 64 MB

Android Vasya attends Maths classes. His group started to study the number theory recently. The teacher gave them several tasks as a homework. One of them is as follows.

There is an integer n. The problem is to find a sequence of integers $a_1, \ldots, a_n$ such that for any k from 2 to n the sum $a_1 + \ldots + a_k$ has exactly a_k different positive divisors. Help Vasya to cope with this task.

Input

The only line contains an integer n ($2 \le n \le 100\,000$).

Output

If there is no such sequence output `Impossible`. Otherwise output space-separated integers $a_1, \ldots, a_n$ ($1 \le a_i \le 300$).

Example

test	answer
3	1 3 4

Problem C. History

Time limit: 1 second
Memory limit: 64 MB

Android Vasya likes the history of the ancient world. He likes to read about various superstitions people had at that time.

Recently Vasya came across a superstition concerning his favorite number 13. It turned out, that ancient people considered this number unlucky and avoided it as much as they could:

- they wouldn't sit at table if there were exactly 13 people;
- they didn't use number 13 in numbering floors of a building: 12-th floor was followed by 14-th one;
- they didn't do anything important on Friday the 13-th.

Vasya was especially amused by the superstition about Friday. How could people think that something bad could happen in such a wonderful day like Friday?

Now Vasya makes a research in the ancient world history covering a period from year A till year B. He wonders how many unlucky Fridays this period contains. Help him to cope with this simple task.

Input

The only line contains integers A and B ($1919 \le A \le B \le 10^9$). Androids use the Gregorian style for chronology. According to it the year is leap if its number is a multiple of 400 or if it is a multiple of 4 but is not a multiple of 100. In the leap years February is extended to 29 days.

Output

For every k from 0 to 12 output how many times in the period from Vasya's research there was a year with exactly k unlucky Fridays.

Example

test	answer
2015 2016	0: 0 1: 1 2: 0 3: 1 4: 0 5: 0 6: 0 7: 0 8: 0 9: 0 10: 0 11: 0 12: 0

Note

In 2015 Fridays are February 13, March 13 and November 13, and in 2016 is May 13 only.

Problem D. Chemistry

Time limit: 1 second
Memory limit: 64 MB

Android Vasya attends his Chemistry classes. During the latest semester Vasya's group is studying dry liquids. At the laboratory work on mixing liquids Vasya has got oxygen oxide. An important feature of this substance is its unpredictable consequences after mixing. The liquid is stable only after mixing it in one to one proportion.

Vasya has got n test tubes, with one nano liter of oxygen oxide in each. Due to the features of the oxide Vasya pours liquids from test tube A to test tube B in such a way that the resulting liquid volume in test tube B doubles. To set the experiment successfully Vasya needs to make exactly k nano liters of the oxide in any of the test tubes. Help him do this.

Input

The only line contains two integers — n and k ($1 \le n \le 100\,000$, $1 \le k \le n$).

Output

Output the sequence of transfers (i. e. pouring from one test tube to another), which results in exactly k nano liters of the oxide being in the first test tube. In the first line output the number of transfers of the liquid m ($0 \le m \le 3n$). Then in m lines output pairs of integers a, b ($1 \le a, b \le N$), meaning that Vasya needs to pour the oxide from the test tube number a to the test tube number b. If such sequence doesn't exist output -1. If there are several solutions output any. It is guaranteed that if there is a sequence of transfers to get k nano liters then there is one with no more than $3n$ transfers.

Examples

test	answer
5 3	4 2 1 4 3 3 1 1 5
5 5	-1

Problem E. 3d-modeling

Time limit: 1 second
Memory limit: 64 MB

Android Vasya's elder friends have already been modeling six-dimensional space ships for quite a long time. Vasya himself hasn't yet acquired such level of mastering. He has only just started the 3d-modeling course. And right now he is doing his first homework.

The homework is pretty easy, one just needs to make a 3d-drawing of any detail. Vasya has already come up with the detail he wants to draw, imagined how it would look like and he even has drawn the first straight line. But something went wrong. Apparently the line turned out to be not the one he needed.

But Vasya has already got the solution for this problem. He plans to rotate the detail in his mind in such a way, that the line he was going to draw would become the line he had actually drawn. Help Vasya find out what rotation he should make for this.

Input

First two lines contain coordinates of the points A and B. These points lie on the drawn line. The third and the fourth lines contain coordinates of the points C and D. These points lie on the line Vasya was going to draw. Point A doesn't coincide with point B, point C doesn't coincide with point D. All numbers in the input data are integers and do not exceed 1000 by absolute value.

Output

If the required rotation doesn't exist output "`Impossible`" in a single line. Otherwise in the first two lines output coordinates of the points P and Q which lie on the rotation axis. In the third line output the rotation angle α in degrees. The distance between points P and Q should not be less than 1. The coordinates of points P and Q should not exceed 2000 by absolute value. The angle should lie within the range [0; 360] and be counted counterclockwise, if one is looking from P to the direction of Q. An answer is considered correct if after rotation of the line CD by the angle α around the axis PQ it results in some line EF, such that the distances from points A and B to this line EF don't exceed 10^{-5}.

Examples

test	answer
0 0 0 0 1 0 0 0 0 1 0 0	0 0 1 0 0 0 90
1 0 1 1 0 0 0 1 1 0 1 0	0 0 1 0 0 0 270

Problem F. Physics

Time limit: 1 second
Memory limit: 64 MB

Android Vasya reads the book "Amusing physics for the smallest children". Recently he has read a chapter about uniformly accelerated motion and decided to set up some experiments. For this purpose, Vasya made a mechanical turtle, that could be provided with a different acceleration by a remote control.

Vasya launched his turtle into the lobby, changing its acceleration several times. After plotting a graph of a piecewise linear velocity function $v_1(t)$ he repeated the experiment. Then he has got a piecewise linear continuous function $v_2(t)$ and plotted its graph too.

Before the third try Vasya has realized that it was a bad idea to plot $v_1(t)$ and $v_2(t)$ on the same graph. Because of this, it was not clear which segments belong to which function. Help Vasya to restore graphs, keeping in mind that both experiments lasted the same time T and both times the turtle covered the same distance, which is the length of the lobby.

Input

The first line contains an integer T that is the duration of each of the experiments ($2 \le T \le 10^6$). Then the description of functions $h(t) = \max(v_1(t), v_2(t))$ and $g(t) = \min(v_1(t), v_2(t))$ follows. The second line contains an integer n that is the number of kink points of the function $h(t)$. The next n lines contain pairs of integers t_i and $h(t_i)$ that are kink points of the function $h(t)$ ($0 = t_1 < t_2 < \cdots < t_{n-1} < t_n = T$; $0 \le h(t_i) \le 10^6$). Any three consecutive kink points don't lie on the same straight line. In the following lines the function $g(t)$ is described in the same format. For any $x \in [0; T]$ $g(t) \le h(t)$ and he equality $g(t) = h(t)$ holds for no more than 30 points (in particular, the graphs don't have common segments). The number of kink points of each function is from 2 to 100 000.

Output

Output functions $v_1(t)$ and $v_2(t)$ in a similar format as $h(t)$ and $g(t)$, including the fact that no three consecutive kink points lie on the same straight line. All numbers in the output should be integers. If this problem has several solutions, output any of them. It's guaranteed that at least one solution exists.

Example

test	answer
6 6 0 2 1 1 2 2 3 1 4 2 6 0 6 0 0 1 1 2 0 3 1 4 0 6 0	5 0 2 1 1 2 2 4 0 6 0 5 0 0 1 1 2 0 4 2 6 0

Problem G. Physical Education

Time limit: 1 second
Memory limit: 64 MB

Once a week android Vasya attends his PE classes. His trainer believes that an ability to think has to be trained as well as physical skills. That is why the trainer often gives his group some tasks which are not quite easy to complete.

Today's task was the following one. Initially n androids stood in one line. The trainer distributed among them different numbers in a decimal notation. All numbers were from 1 to n according to the order in which the androids stood, from left to right. On the trainer's command students should re-form the line in a new order. Any two neighboring androids in the new line should meet one of the following conditions:

- the sum of digits in the left android's number is less than the sum of digits in the right android's number;
- the sums of digits in their numbers are equal and the left android's number is less than the right one's.

The group was completing the task very slowly. But Vasya found it very boring as he was the first in the line and didn't have to change his place.

While the androids were re-forming, Vasya decided to determine how many of them didn't need to change their places. Help him to count this.

Input

The only line contains an integer n that is the number of androids in the group ($2 \le n \le 10^9$).

Output

Output the number of androids who didn't have to change their places.

Example

test	answer
19	3

Explanation

New order is 1, 10, 2, 11, 3, 12, 4, 13, 5, 14, 6, 15, 7, 16, 8, 17, 9, 18, 19. Androids 18 and 19 along with Vasya didn't have to change their places.

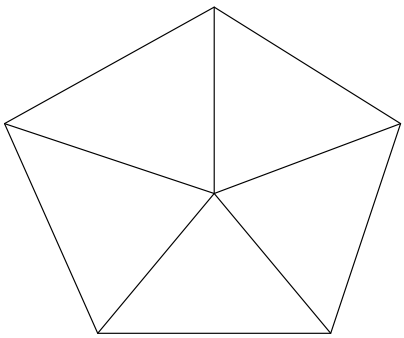
Problem H. Biology

Time limit: 1 second
Memory limit: 64 MB

Android Vasya prepares a research work in Biology. In this work he studies the class of arachnoid. Vasya is not interested in spiders themselves, his work is mostly concentrated on the webs made by different species of spiders.

Vasya has already found out how the web is made. It is a set of points — the web knots, connected with each other by the so-called fibres. One may imagine the web knots as coplanar points. The web fibres are line segments, connecting the knots. An important property of these segments is that they cross only in the knots.

Vasya wants to determine which spiders make webs with the highest quality. For this purpose he defined *the stickiness* of the web as amount of different *traps* in it. *A trap* is a polygon with no self-crossings and self-tagencies, where knots of the web are vertexes and fibres are edges.



Vasya has analysed several webs with 16 knots. As a result, he has discovered that stickiness of those webs is between 5 000 and 300 000. And now he is interested in finding out how a web with 16 knots and stickiness more than 300 000 can look like.

Input

There is no input data in this task.

Output

In the first 16 lines output coordinates of the web knots as pairs of integers x_i, y_i ($-1000 \le x_i, y_i \le 1000$). In the next 16 lines output an adjacency matrix of the web — the table of a size 16×16, composed of the symbols "0" и "1". The matrix should be symmetrical and its main diagonal should be filled with zeros.

Any two knots of the web should lie in different points. Knots mustn't lie on the inner points of the fibres. Any two fibres may cross only in their common knot.

The web should have stickiness more than 300 000. It is guaranteed that such webs exist.

Example

test	answer
	0 0 5 -6 -5 -6 -9 3 0 8 9 3 011111 101001 110100 101010 100101 110010

Note

The answer in the example is not correct and just illustrates the answer format. Note, that you should output the web with 16, not 6, knots. The picture above corresponds to this example. The stickiness of the web in the example is only 21.

Problem I. Astronomy

Time limit: 1 second
Memory limit: 64 MB

Android Vasya attends his Astronomy classes. Today on the laboratory work he had to count out the obliquity angle of sun rays. Help Vasya do this using the following facts.

- The Earth orbit is a circle with the center in the center of the Sun. The Earth evenly moves along it counter clockwise, if to watch at the plane of the Erath orbit from the North Pole. A complete circle is made for exactly 365 days.
- The Earth is a full sphere, rotating round its axis counter clockwise, if to watch at it from the North Pole. The Earth axis of rotation digresses from the perpendicular to the plane of the Earth orbit for 23.439281 degrees.
- The meredian where Vasya is located is the nearest meredian to the Earth orbit's center at each midday. The period from one midday to the next one lasts exactly one day, i.e. 24 hours. The moment of summer solstice falls at midday of 21 of June.
- At each moment of time sun rays can be considered parallel to the segment which connects the Earth center with the Earth's orbit center.

Input

The first line contains a real number l — the latitude of the point of Vasya's being and an integer n — the number of tests (l contains not more than two digits after the decimal point; $-89.99 \le l \le 89.99$; $1 \le n \le 8760$). Each of the next n lines contains an integer d — the day of a month, the string m — a short name of a month, and an integer h — the hour. m may take one of the following values: "`jan`", "`feb`", "`mar`", "`apr`", "`may`", "`jun`", "`jul`", "`aug`", "`sep`", "`oct`", "`nov`", "`dec`". d lies within the range from 1 to the number of days in the month m. $0 \le h \le 23$. The calendar is the same as in the Gregorian style for the non-leap years.

Output

Output one line for every test containing the angle in degrees between the Sun rays and the plane, which is tangent to the Earth surface at the point of Vasya's being, at given day h hours and 0 minutes. If at that moment the Sun is under horizon output 0.00. The answers should be output with absolute or relative precision at least 10^{-6}.

Examples

test	answer
56 3 17 nov 12 17 nov 22 7 jul 12	14.496810046 0.0000000000 56.491608912
-66.57 1 22 jun 12	0.0000000000

Note

The soltice is the moment when Sun rays fall on the Earth parallel to the plane, which is perpendicular to the Earth orbit and goes through the Earth axis. The summer soltice is the one out of two such moments at which the North Pole is lighted.

Problem J. Urban geography

Time limit: 2 seconds
Memory limit: 64 MB

Android Vasya prepares a project in Urban geography. The aim of the project is to improve the infrasructure of the city he lives in.

Now the city consists of n districts, some of which are connected by roads. Using these roads one can get from any district to any other district of the city by car. Vasya thinks that such big amount of roads makes citizens use their own cars instead of walking or cycling. He wants to close as many roads for cars as possible and turn them into boulevards. Of course, Vasya wants to keep the possibility to get from any district to any other district of the city by car using roads.

Now citizens pay for using roads, and prices for different roads may vary very much. Vasya thinks that leaving open some expensive and some cheap roads at the same time is not a good idea beacuse it can increase social tension in the city. That's why he wants to minimize the price spread between the most expensive and the cheapest roads. Help Vasya choose the roads to keep open.

Input

The first line contains integers n и m — the number of city districts and roads accordingly ($2 \le n \le 30\,000; n-1 \le m \le 30\,000$). The next m lines contain triples of integers a_i, b_i и c_i, meaning that between the city districts a_i и b_i there is a road with the price c_i ($1 \le a_i, b_i \le n$; $a_i \ne b_i$; $1 \le c_i \le 10^9$). There can be several roads between two districts.

Output

In the only line output the sequence of integers — numbers of the roads which should be kept open in the city. The roads are numbered as they appear in the input data. If there are several solutions, output any of them.

Examples

test	answer
3 3 1 2 1 2 3 3 3 1 4	2 3
4 5 1 2 1 2 3 1 1 3 2 1 4 2 2 4 1	1 2 5

Problem K. Scholarship

Time limit: 1 second
Memory limit: 64 MB

At last the first term at the University came to its finish. Android Vasya has already passed all the exams and wants to know if he gets a scholarship. There is the following practice of giving scholarship to students at the University:

- if a student has got satisfactory marks, the scholarship is not given,
- if a student has passed through the examination period with only excellent marks, he gets a personal scholarship,
- if a student doesn't get a personal scholarship and his average mark is not less than 4.5, he gets a high scholarship,
- if a student gets neither high nor personal scholarship and doesn't have satisfactory marks, he gets a common scholarship.

A satisfactory mark corresponds to value 3, a good mark corresponds to value 4, and an excellent mark corresponds to value 5. An average mark for a student is the average value of all the marks this student got in his exams.

Help Vasya find out which scholarship he gets.

Input

The first line contains an integer n — the number of exams ($1 \le n \le 10$). In the i-th of the next n lines there is an integer m_i — value of Vasya's mark in i-th exam ($3 \le m_i \le 5$).

Output

If Vasya doesn't get any scholarship output "`None`". If he gets a common scholarship output "`Common`", if he gets a high scholarship output "`High`", if he gets a personal one output "`Named`".

Examples

test	answer
3 5 5 4	High
3 3 3 3	None