Experimental Educational Round: VolBIT Formulas Blitz

A. Again Twenty Five!

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

The HR manager was disappointed again. The last applicant failed the interview the same way as 24 previous ones. "Do I give such a hard task?" — the HR manager thought. "Just raise number 5 to the power of n and get last two digits of the number. Yes, of course, n can be rather big, and one cannot find the power using a calculator, but we need people who are able to think, not just follow the instructions."

Could you pass the interview in the machine vision company in IT City?

Input

The only line of the input contains a single integer n ($2 \le n \le 2 \cdot 10^{18}$) — the power in which you need to raise number 5.

Output

Output the last two digits of 5^n without spaces between them.

Examples

input
2
output
25

B. Moore's Law

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

The city administration of IT City decided to fix up a symbol of scientific and technical progress in the city's main square, namely an indicator board that shows the effect of Moore's law in real time.

Moore's law is the observation that the number of transistors in a dense integrated circuit doubles approximately every 24 months. The implication of Moore's law is that computer performance as function of time increases exponentially as well.

You are to prepare information that will change every second to display on the indicator board. Let's assume that every second the number of transistors increases exactly 1.000000011 times.

Input

The only line of the input contains a pair of integers n ($1000 \le n \le 10\ 000$) and t ($0 \le t \le 2\ 000\ 000\ 000$) — the number of transistors in the initial time and the number of seconds passed since the initial time.

Output

Output one number — the estimate of the number of transistors in a dence integrated circuit in t seconds since the initial time. The relative error of your answer should not be greater than 10^{-6}.

Examples

input
1000 1000000
output
1011.060722383550382782399454922040

C. Lucky Numbers

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

The numbers of all offices in the new building of the Tax Office of IT City will have lucky numbers.

Lucky number is a number that consists of digits 7 and 8 only. Find the maximum number of offices in the new building of the Tax Office given that a door-plate can hold a number not longer than n digits.

Input

The only line of input contains one integer n ($1 \le n \le 55$) — the maximum length of a number that a door-plate can hold.

Output

Output one integer — the maximum number of offices, than can have unique lucky numbers not longer than n digits.

Examples

input
2
output
6

D. Hexagons!

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

After a probationary period in the game development company of IT City Petya was included in a group of the programmers that develops a new turn-based strategy game resembling the well known "Heroes of Might & Magic". A part of the game is turn-based fights of big squadrons of enemies on infinite fields where every cell is in form of a hexagon.

Some of magic effects are able to affect several field cells at once, cells that are situated not farther than n cells away from the cell in which the effect was applied. The distance between cells is the minimum number of cell border crosses on a path from one cell to another.

It is easy to see that the number of cells affected by a magic effect grows rapidly when n increases, so it can adversely affect the game performance. That's why Petya decided to write a program that can, given n, determine the number of cells that should be repainted after effect application, so that game designers can balance scale of the effects and the game performance. Help him to do it. Find the number of hexagons situated not farther than n cells away from a given cell.

Input

The only line of the input contains one integer n ($0 \le n \le 10^9$).

Output

Output one integer — the number of hexagons situated not farther than n cells away from a given cell.

Examples

input
2
output
19

E. A rectangle

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Developing tools for creation of locations maps for turn-based fights in a new game, Petya faced the following problem.

A field map consists of hexagonal cells. Since locations sizes are going to be big, a game designer wants to have a tool for quick filling of a field part with identical enemy units. This action will look like following: a game designer will select a rectangular area on the map, and each cell whose center belongs to the selected rectangle will be filled with the enemy unit.

More formally, if a game designer selected cells having coordinates (x_1, y_1) and (x_2, y_2), where $x_1 \le x_2$ and $y_1 \le y_2$, then all cells having center coordinates (x, y) such that $x_1 \le x \le x_2$ and $y_1 \le y \le y_2$ will be filled. Orthogonal coordinates system is set up so that one of cell sides is parallel to OX axis, all hexagon centers have integer coordinates and for each integer x there are cells having center with such x coordinate and for each integer y there are cells having center with such y coordinate. It is guaranteed that difference $x_2 - x_1$ is divisible by 2.

Working on the problem Petya decided that before painting selected units he wants to output number of units that will be painted on the map.

Help him implement counting of these units before painting.

Input

The only line of input contains four integers x_1, y_1, x_2, y_2 ($-10^9 \le x_1 \le x_2 \le 10^9$, $-10^9 \le y_1 \le y_2 \le 10^9$) — the coordinates of the centers of two cells.

Output

Output one integer — the number of cells to be filled.

Examples

input
1 1 5 5
output
13

F. Selection of Personnel

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

One company of IT City decided to create a group of innovative developments consisting from 5 to 7 people and hire new employees for it. After placing an advertisment the company received n resumes. Now the HR department has to evaluate each possible group composition and select one of them. Your task is to count the number of variants of group composition to evaluate.

Input

The only line of the input contains one integer n ($7 \le n \le 777$) — the number of potential employees that sent resumes.

Output

Output one integer — the number of different variants of group composition.

Examples

input
7
output
29

G. Challenge Pennants

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Because of budget cuts one IT company established new non-financial reward system instead of bonuses.

Two kinds of actions are rewarded: fixing critical bugs and suggesting new interesting features. A man who fixed a critical bug gets "I fixed a critical bug" pennant on his table. A man who suggested a new interesting feature gets "I suggested a new feature" pennant on his table.

Because of the limited budget of the new reward system only 5 "I fixed a critical bug" pennants and 3 "I suggested a new feature" pennants were bought.

In order to use these pennants for a long time they were made challenge ones. When a man fixes a new critical bug one of the earlier awarded "I fixed a critical bug" pennants is passed on to his table. When a man suggests a new interesting feature one of the earlier awarded "I suggested a new feature" pennants is passed on to his table.

One man can have several pennants of one type and of course he can have pennants of both types on his table. There are n tables in the IT company. Find the number of ways to place the pennants on these tables given that each pennant is situated on one of the tables and each table is big enough to contain any number of pennants.

Input

The only line of the input contains one integer n ($1 \le n \le 500$) — the number of tables in the IT company.

Output

Output one integer — the amount of ways to place the pennants on n tables.

Examples

input
2
output
24

H. Benches

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

The city park of IT City contains n east to west paths and n north to south paths. Each east to west path crosses each north to south path, so there are n^2 intersections.

The city funded purchase of five benches. To make it seems that there are many benches it was decided to place them on as many paths as possible. Obviously this requirement is satisfied by the following scheme: each bench is placed on a cross of paths and each path contains not more than one bench.

Help the park administration count the number of ways to place the benches.

Input

The only line of the input contains one integer n ($5 \le n \le 100$) — the number of east to west paths and north to south paths.

Output

Output one integer — the number of ways to place the benches.

Examples

input
5
output
120

I. Parking Lot

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

To quickly hire highly skilled specialists one of the new IT City companies made an unprecedented move. Every employee was granted a car, and an employee can choose one of four different car makes.

The parking lot before the office consists of one line of $(2n - 2)$ parking spaces. Unfortunately the total number of cars is greater than the parking lot capacity. Furthermore even amount of cars of each make is greater than the amount of parking spaces! That's why there are no free spaces on the parking lot ever.

Looking on the straight line of cars the company CEO thought that parking lot would be more beautiful if it contained exactly n successive cars of the same make. Help the CEO determine the number of ways to fill the parking lot this way.

Input

The only line of the input contains one integer n $(3 \le n \le 30)$ — the amount of successive cars of the same make.

Output

Output one integer — the number of ways to fill the parking lot by cars of four makes using the described way.

Examples

input
3
output
24

Note

Let's denote car makes in the following way: A — Aston Martin, B — Bentley, M — Mercedes-Maybach, Z — Zaporozhets. For $n = 3$ there are the following appropriate ways to fill the parking lot: AAAB AAAM AAAZ ABBB AMMM AZZZ BBBA BBBM BBBZ BAAA BMMM BZZZ MMMA MMMB MMMZ MAAA MBBB MZZZ ZZZA ZZZB ZZZM ZAAA ZBBB ZMMM

Originally it was planned to grant sport cars of Ferrari, Lamborghini, Maserati and Bugatti makes but this idea was renounced because it is impossible to drive these cars having small road clearance on the worn-down roads of IT City.

J. Divisibility

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

IT City company developing computer games invented a new way to reward its employees. After a new game release users start buying it actively, and the company tracks the number of sales with precision to each transaction. Every time when the next number of sales is divisible by all numbers from 2 to 10 every developer of this game gets a small bonus.

A game designer Petya knows that the company is just about to release a new game that was partly developed by him. On the basis of his experience he predicts that n people will buy the game during the first month. Now Petya wants to determine how many times he will get the bonus. Help him to know it.

Input

The only line of the input contains one integer n ($1 \le n \le 10^{18}$) — the prediction on the number of people who will buy the game.

Output

Output one integer showing how many numbers from 1 to n are divisible by all numbers from 2 to 10.

Examples

input
3000
output
1

K. Indivisibility

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

IT City company developing computer games decided to upgrade its way to reward its employees. Now it looks the following way. After a new game release users start buying it actively, and the company tracks the number of sales with precision to each transaction. Every time when the next number of sales is not divisible by any number from 2 to 10 every developer of this game gets a small bonus.

A game designer Petya knows that the company is just about to release a new game that was partly developed by him. On the basis of his experience he predicts that n people will buy the game during the first month. Now Petya wants to determine how many times he will get the bonus. Help him to know it.

Input

The only line of the input contains one integer n ($1 \le n \le 10^{18}$) — the prediction on the number of people who will buy the game.

Output

Output one integer showing how many numbers from 1 to n are not divisible by any number from 2 to 10.

Examples

input
12
output
2

L. Cracking the Code

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

The protection of a popular program developed by one of IT City companies is organized the following way. After installation it outputs a random five digit number which should be sent in SMS to a particular phone number. In response an SMS activation code arrives.

A young hacker Vasya disassembled the program and found the algorithm that transforms the shown number into the activation code. *Note: it is clear that Vasya is a law-abiding hacker, and made it for a noble purpose — to show the developer the imperfection of their protection.*

The found algorithm looks the following way. At first the digits of the number are shuffled in the following order <first digit><third digit><fifth digit><fourth digit><second digit>. For example the shuffle of 12345 should lead to 13542. On the second stage the number is raised to the fifth power. The result of the shuffle and exponentiation of the number 12345 is $455\,422\,043\,125\,550\,171\,232$. The answer is the 5 last digits of this result. For the number 12345 the answer should be 71232.

Vasya is going to write a keygen program implementing this algorithm. Can you do the same?

Input

The only line of the input contains a positive integer five digit number for which the activation code should be found.

Output

Output exactly 5 digits without spaces between them — the found activation code of the program.

Examples

input
12345
output
71232

M. Turn

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Vasya started working in a machine vision company of IT City. Vasya's team creates software and hardware for identification of people by their face.

One of the project's know-how is a camera rotating around its optical axis on shooting. People see an eye-catching gadget — a rotating camera — come up to it to see it better, look into it. And the camera takes their photo at that time. What could be better for high quality identification?

But not everything is so simple. The pictures from camera appear rotated too (on clockwise camera rotation frame the content becomes rotated counter-clockwise). But the identification algorithm can work only with faces that are just slightly deviated from vertical.

Vasya was entrusted to correct the situation — to rotate a captured image so that image would be minimally deviated from vertical. Requirements were severe. Firstly, the picture should be rotated only on angle divisible by 90 degrees to not lose a bit of information about the image. Secondly, the frames from the camera are so huge and FPS is so big that adequate rotation speed is provided by hardware FPGA solution only. And this solution can rotate only by 90 degrees clockwise. Of course, one can apply 90 degrees turn several times but for the sake of performance the number of turns should be minimized.

Help Vasya implement the program that by the given rotation angle of the camera can determine the minimum number of 90 degrees clockwise turns necessary to get a picture in which up direction deviation from vertical is minimum.

The next figure contains frames taken from an unrotated camera, then from rotated 90 degrees clockwise, then from rotated 90 degrees counter-clockwise. Arrows show direction to "true up".

The next figure shows 90 degrees clockwise turn by FPGA hardware.

Input

The only line of the input contains one integer x ($-10^{18} \le x \le 10^{18}$) — camera angle in degrees. Positive value denotes clockwise camera rotation, negative — counter-clockwise.

Output

Output one integer — the minimum required number of 90 degrees clockwise turns.

Examples

input
60
output
1

input
-60
output
3

Note

When the camera is rotated 60 degrees counter-clockwise (the second example), an image from it is rotated 60 degrees clockwise. One 90 degrees clockwise turn of the image result in 150 degrees clockwise total rotation and deviation from "true up" for one turn is 150 degrees. Two 90 degrees clockwise turns of the image result in 240 degrees clockwise total rotation and deviation from "true up" for two turns is 120 degrees because 240 degrees clockwise equal to 120 degrees counter-clockwise. Three 90 degrees clockwise turns of the image result in 330 degrees clockwise total rotation and deviation from "true up" for three turns is 30 degrees because 330 degrees clockwise equal to 30 degrees counter-clockwise.

From 60, 150, 120 and 30 degrees deviations the smallest is 30, and it it achieved in three 90 degrees clockwise turns.

N. Forecast

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

The Department of economic development of IT City created a model of city development till year 2100.

To prepare report about growth perspectives it is required to get growth estimates from the model.

To get the growth estimates it is required to solve a quadratic equation. Since the Department of economic development of IT City creates realistic models only, that quadratic equation has a solution, moreover there are exactly two different real roots.

The greater of these roots corresponds to the optimistic scenario, the smaller one corresponds to the pessimistic one. Help to get these estimates, first the optimistic, then the pessimistic one.

Input

The only line of the input contains three integers a, b, c ($-1000 \le a, b, c \le 1000$) — the coefficients of $ax^2 + bx + c = 0$ equation.

Output

In the first line output the greater of the equation roots, in the second line output the smaller one. Absolute or relative error should not be greater than 10^{-6}.

Examples

input
1 30 200
output
-10.000000000000000 -20.000000000000000

O. Arrow

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

Petya has recently started working as a programmer in the IT city company that develops computer games.

Besides game mechanics implementation to create a game it is necessary to create tool programs that can be used by game designers to create game levels. Petya's first assignment is to create a tool that allows to paint different arrows on the screen.

A user of this tool will choose a point on the screen, specify a vector (the arrow direction) and vary several parameters to get the required graphical effect. In the first version of the program Petya decided to limit parameters of the arrow by the following: a point with coordinates (px, py), a nonzero vector with coordinates (vx, vy), positive scalars $a, b, c, d, a > c$.

The produced arrow should have the following properties. The arrow consists of a triangle and a rectangle. The triangle is isosceles with base of length a and altitude of length b perpendicular to the base. The rectangle sides lengths are c and d. Point (px, py) is situated in the middle of the triangle base and in the middle of side of rectangle that has length c. Area of intersection of the triangle and the rectangle is zero. The direction from (px, py) point to the triangle vertex opposite to base containing the point coincides with direction of (vx, vy) vector.

Enumerate the arrow points coordinates in counter-clockwise order starting from the tip.

Input

The only line of the input contains eight integers px, py, vx, vy ($-1000 \le px, py, vx, vy \le 1000, vx^2 + vy^2 > 0$), a, b, c, d ($1 \le a, b, c, d \le 1000, a > c$).

Output

Output coordinates of the arrow points in counter-clockwise order. Each line should contain two coordinates, first x, then y. Relative or absolute error should not be greater than 10^{-9}.

Examples

input
8 8 0 2 8 3 4 5
output
8.000000000000 11.000000000000 4.000000000000 8.000000000000 6.000000000000 8.000000000000 6.000000000000 3.000000000000 10.000000000000 3.000000000000 10.000000000000 8.000000000000 12.000000000000 8.000000000000

P. Area of a Star

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

It was decided in IT City to distinguish successes of local IT companies by awards in the form of stars covered with gold from one side. To order the stars it is necessary to estimate order cost that depends on the area of gold-plating. Write a program that can calculate the area of a star.

A "star" figure having $n \geq 5$ corners where n is a prime number is constructed the following way. On the circle of radius r n points are selected so that the distances between the adjacent ones are equal. Then every point is connected by a segment with two maximally distant points. All areas bounded by the segments parts are the figure parts.

Input

The only line of the input contains two integers n ($5 \leq n < 10^9$, n is prime) and r ($1 \leq r \leq 10^9$) — the number of the star corners and the radius of the circumcircle correspondingly.

Output

Output one number — the star area. The relative error of your answer should not be greater than 10^{-7}.

Examples

input
7 10
output
108.395919545675

Q. Pyramids

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

IT City administration has no rest because of the fame of the Pyramids in Egypt. There is a project of construction of pyramid complex near the city in the place called Emerald Walley. The distinction of the complex is that its pyramids will be not only quadrangular as in Egypt but also triangular and pentagonal. Of course the amount of the city budget funds for the construction depends on the pyramids' volume. Your task is to calculate the volume of the pilot project consisting of three pyramids — one triangular, one quadrangular and one pentagonal.

The first pyramid has equilateral triangle as its base, and all 6 edges of the pyramid have equal length. The second pyramid has a square as its base and all 8 edges of the pyramid have equal length. The third pyramid has a regular pentagon as its base and all 10 edges of the pyramid have equal length.

Input

The only line of the input contains three integers l_3, l_4, l_5 ($1 \le l_3, l_4, l_5 \le 1000$) — the edge lengths of triangular, quadrangular and pentagonal pyramids correspondingly.

Output

Output one number — the total volume of the pyramids. Absolute or relative error should not be greater than 10^{-9}.

Examples

input
2 5 3
output
38.546168065709

R. Game

time limit per test: 0.5 seconds
memory limit per test: 64 megabytes
input: standard input
output: standard output

There is a legend in the IT City college. A student that failed to answer all questions on the game theory exam is given one more chance by his professor. The student has to play a game with the professor.

The game is played on a square field consisting of $n \times n$ cells. Initially all cells are empty. On each turn a player chooses and paint an empty cell that has no common sides with previously painted cells. Adjacent corner of painted cells is allowed. On the next turn another player does the same, then the first one and so on. The player with no cells to paint on his turn loses.

The professor have chosen the field size n and allowed the student to choose to be the first or the second player in the game. What should the student choose to win the game? Both players play optimally.

Input

The only line of the input contains one integer n ($1 \le n \le 10^{18}$) — the size of the field.

Output

Output number `1`, if the player making the first turn wins when both players play optimally, otherwise print number `2`.

Examples

input
1
output
1

input
2
output
2