Python Course Midterm Exam

---

1. Print the sum of the values from 1 to 5. Use only the print statement and operators.

2. After printing 40 asterisks ('*') in a line, you should print 20 strings ('# ') each consisting of one hash(#) and one space. Use the operator * to implement the code. Do not use a loop.

3. Write a program that takes two random integers as input and lists them from smallest to largest.

4. Among the positive natural numbers other than 1, a number that is not prime is called a composite number. Print whether the numbers from 2 to 12 are prime or composite.

5. An Armstrong number is a three-digit integer that is equal to the sum of the cubes of each digit. Find all Armstrong numbers among three-digit integers and print them.

6. If there are two lists l1 and l2, use the combination of l1 and l2 to print as follows:

l1	I like
	I love

l2	Pancake
	Kiwi Juice
	Espresso

```
I like pancake.
I like kiwi juice.
I like espresso.
I love pancake.
I love kiwi juice.
I love espresso.
```

Python Course Midterm Exam

7. With tuple data, the values of two variables can be swapped without using a temporary variable. Using this swapping method, write a program that moves the largest value in the given list to the last.

list	5, 6, 3, 9, 2, **12**, 3, 8, 7

8. There is a ‘scores’ tuple as follows. This tuple contains information about four students, including each student's name and English, math, and science grades. For example, 'Hyun' has an English score of 88, a math score of 95, and a science score of 90. Extract only math scores by unpacking the scores tuple. Write a code that calculates the average of these extracted math scores.
   Print the float number rounded to one decimal place using string formatting (‘format’ statement).
   Caution: When unpacking, use the syntax of anonymous variables.

```
scores = ( ('Hyun', 88, 95, 90), ('Kang', 85, 90, 95), ('Park', 70, 90, 80), ('Hong', 90, 90, 95))
```

9. The radius of the circle is given. Print the calculated circumference and area of the circle on the screen.

(Mission for Section 2)

Input Form	Output Form
7	The area of a circle 153.86 The circumference of a circle 43.96

Python Course Midterm Exam

---

10. Use the int function to add the string '50' and the number 50, resulting in the number 100. Additionally, utilize the str function to print the addition result as '5050'.
    The first line should print the number 100.
    the second line should print the string "5050."

(Problem of Paper Coding for Section 2)

11. Use the character '1' once and the character '0' three times to create the number 1000. Print the number 1000 using the addition operation.
    Caution: Use the int() function only once.

(Problem of Paper Coding for Section 2)

12. The factorial of N, denoted as N!, is defined as N x (N - 1) x (N - 2) x … x 2 x 1.
    The integer N is given. Calculate N! and print it as follows:

(Problem of Pair Programming for Section 2)

Input Form	Output Form
3	3! = 6

Input Form	Output Form
5	5! = 120

Input Form	Output Form
10	10! = 3628800

Python Course Midterm Exam

13. The name, height, and weight are given. Calculate and print the BMI (Body Mass Index). BMI is calculated by dividing one's weight by the square of their height, and the formula is kg/m².

    Input Form:
    The height is given on the first line (unit: cm).
    The weight is given on the second line (unit: kg).

    Output Form: Print the float number rounded to two decimal places using string formatting (‘format’ statement).

(Mission for Section 3)

Input Form	Output Form
180 70	21.60

14. Assign the values 30 and 60 to variables named width and height, respectively. Using these two variables, calculate the area of a rectangle and print.

(Problem of Paper Coding for Section 3)

15. The Pythagorean theorem states that in any right-angled triangle, the square of the hypotenuse (c) is equal to the squares' summation of the base (a) and the height (b): $c^2 = a^2 + b^2$.
    Calculate the length of the hypotenuse and print.

    Input Form:
    The base (a) is given on the first line.
    The height (b) is given on the second line.

    Output Form: Print the answer.

(Problem of Paper Coding for Section 3)

Python Course Midterm Exam

16. In the multiplication table, the number for which multiplication table to print is given. Print the corresponding multiplication table.

    Input Form: The number for which multiplication table to print is given

    Output Form:
    The variable ‘a’ should iterate over the values 1 to 9, and ‘n’ is the input number. The part corresponding to a * n should be replaced with the actual value, such as 1 * 2, to display the result of the expression.

(Problem of Pair Programming for Section 3)

Input Form	Output Form
2	1 * 2 = 1 2 * 2 = 4 3 * 2 = 9 4 * 2 = 16 5 * 2 = 25 6 * 2 = 36 7 * 2 = 49 8 * 2 = 64 9 * 2 = 81

17. The year is given. Print ‘True’ or ‘False’ indicating whether it is a leap year.
    The logical operation to determine a leap year is 'the year is divisible by 4 but not by 100, or the year is divisible by 400.'

(Mission for Section 4)

Python Course Midterm Exam

18. The integer N is given. Print ‘True’ if the given integer N is odd, or ‘False’ if it is even.

(Problems about Paper Coding for Section 6 and Key Concepts for Section 7)

Input Form	Output Form
20	False

Input Form	Output Form
21	True

19. The integer N is given. Print ‘True’ if the given integer N is odd within the range of 0 to 10, or ‘False’ if it is even.

(Problem of Paper Coding for Section 4)

Input Form	Output Form
12	False

Input Form	Output Form
2	True

20. The three-digit integer N is given. Print ‘True’ if the hundreds digit of the N is 3, or ‘False’ if not.

(Problem of Pair Programming for Section 4)

Input Form	Output Form
321	True

Input Form	Output Form
222	False

Python Course Midterm Exam

21. The integer N is given. Print ‘True’ if it is a multiple of 5, or ‘False’ if not.

(Problem of Pair Programming for Section 4)

Input Form	Output Form
125	True

Input Form	Output Form
2	False

22. The three integers are given. The winning numbers for the lottery are 2, 3, and 9. If the three input integers are the same as the lottery winning numbers, regardless of the order, print "You won the lottery!"

    Input Form: Three integers are given, separated by spaces.

    Output Form: Print the answer.

(Mission for Section 5)

23. An integer N between -100 and 100 is given. If N is a positive integer, print ‘Natural number’.

(Problem of Paper Coding for Section 5)

Input Form	Output Form
50	Natural number

Input Form	Output Form
-10	

Python Course Midterm Exam

24. There is an amusement ride that only people with a height of 110cm or above and age of 65 or below can ride.

    Input Form: The age and height are given, separated by spaces.

    Output Form:
    On the first line, if the age is 0 or above, print 'Adult', if the age is 10 or above and less than 20, print 'Youth', and if the age is less than 10, print 'Kid'.
    On the second line, if the age is ‘Youth’ or above and the height is 110cm or above, print 'You can enter'.

(Problem of Pair Programming for Section 5)

Input Form	Output Form
20 180	Adult You can enter

Input Form	Output Form
10 110	Youth You can enter

Input Form	Output Form
10 100	Youth

Input Form	Output Form
8 120	Kid

25. Create a penalty shootout game where the user attempts penalty kicks against a computer goalkeeper. The computer will defend one of three areas: 'left’, 'center’, or 'right’, randomly (Use the random module).
    The user will input their choice from the three areas: 'left,' 'center,' or 'right.' If the user's input matches the computer's choice, it will print 'No goal'; otherwise, it will print 'GOAL!'

(Mission for Section 6)

Python Course Midterm Exam

26. A single alphabet character is given, separated by spaces. Print ‘Vowel’ if it is one of the following: a, e, i, o, u; otherwise, print ‘Consonant’.
    Caution: Use a list in the conditional statement.

(Problem for Section 6 & 7)

Input Form	Output Form
k	Consonant

Input Form	Output Form
a	Vowel

27. A point with X and Y coordinates are given. and determines which quadrant (1, 2, 3, or 4) the point belongs to. The quadrants are defined as shown in the following diagram.

    Input Form: The X and Y coordinates are given, separated by spaces.

    Output Form: Print the answer.

(Problem of Pair Programming for Section 6)

Input Form	Output Form
1 2.5	1

Input Form	Output Form
-5 6	2

Input Form	Output Form
-5 -6	3

Input Form	Output Form
1.5 -2	4

Python Course Midterm Exam

28. There is a ‘person’ list as follows. It contains information about four people, and each person's name, age, gender, height, and weight are stored in order.

```
person1 = ['David Doe', 20, 1, 180.0, 100.0]
person2 = ['John Smith', 25, 1, 170.0, 70.0]
person3 = ['Jane Carter', 22, 0, 169.0, 60.0]
person4 = ['Peter Kelly', 40, 1, 150.0, 50.0]

person = person1 + person2 + person3 + person4

print(person)
```

```
['David Doe', 20, 1, 180.0, 100.0, 'John Smith', 25, 1, 170.0, 70.0, 'Jane Carter', 22, 0, 169.0, 60.0, 'Peter Kelly', 40, 1, 150.0, 50.0]
```

Use slicing to extract only the ages from the list ‘person’. Then calculate and print the average age.

(Mission for Section 7)

29. One or more strings are given. Store the 's_list' list containing these strings, compare the lengths of all the strings from ‘s_list[0]’ using the ‘len’ function, and print the shortest string. If there are multiple strings with the shortest length, **print the first occurring string**!
Caution: Do not use the ‘min’ function or the ‘sort’ method.

Input Form: One or more strings are given, separated by spaces.

Output Form: Print the shortest string.

(Problem of Pair Programming for Section 7)

Input Form	Output Form
abc bcd bcdefg abba cddc opq	abc

Input Form	Output Form
AnB School student	AnB

Python Course Midterm Exam

---

30. One or more strings are given. Store the 's_list' list containing these strings, compare the lengths of all the strings from ‘s_list[0]’ using the ‘len’ function, and print the shortest string. If there are multiple strings with the shortest length, **print all of them**!
Caution: Do not use the ‘min’ function or the ‘sort’ method.

    Input Form: One or more strings are given, separated by spaces.

    Output Form: Print all the strings separated by commas.

(Problem of Pair Programming for Section 7)

Input Form	Output Form
abc bcd bcdefg abba cddc opq	abc, bcd, opq

31. Here are the types of bread available: "Rye bread", "Wheat", and "White". The types of meat are available: "Meatball", "Sausages", and "Chicken breast". The types of vegetable are available: "Lettuce", "Tomato", and "Cucumber". The types of sauces are available: "Mayonnaise", "Honey mustard", and "Chili sauce".
    Let's print all the types of sandwiches that can be made through combinations of bread, meat, vegetables, and sauce such as: Rye bread + Sausages + Cucumber + Mayonnaise.
    Only one ingredient can be selected from each category.

(Mission for Section 8)

Python Course Midterm Exam

32. A natural number N (N ≤ 100) is given. We want to arrange seat numbers in an N-row by N-column format as follows: Increase by 1 from left to right, then move to the next row after the Nth column, and increase by 1 from right to left. After moving to the next row from the first column, proceed from left to right again.
Print the seat numbers accordingly, aligning each seat number to the right with 3 digits.

(Problem of Pair Programming for Section 8)

Input Form	Output Form
5	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

33. The computer has a random integer between 1 and 100 as the answer. When the user provides a guess, the computer only informs whether the provided integer is ‘Higher’ or ‘Lower’ than the stored ‘Answer’. This game continues until the user guesses correctly.

(Problem of Pair Programming for Section 9)

Input Form	Output Form
50	Higher

Input Form	Output Form
30	Lower

Input Form	Output Form
20	Answer

Python Course Midterm Exam

34. The population composition numbers of the village are given. The population counts in the order of 0-9 years old, teenagers, 20s, 30s, 40s, 50s, 60s, 70s, 80s, 90s, and 100 years old and above.

Village	0 ~ 9	10 ~ 19	20 ~ 29	30 ~ 39	40 ~ 49	50 ~ 59	60 ~ 69	70 ~ 79	80 ~ 89	90 ~ 99	Over 100
A	100	150	230	120	180	100	140	95	81	21	4
B	300	420	530	420	400	300	40	5	1	1	1

The aging ratio can be calculated by dividing the number of elderly people aged 70 and above by the total population.
Create two tuples. Then, print the aging ratio for each of the two villages.

Input Form:
On the first line, the population composition numbers of village A are given.
The population counts for each age group in the order of 0-9 years old, teenagers, 20s, 30s, 40s, 50s, 60s, 70s, 80s, 90s, and 100 years old and above are given, separated by spaces.
On the second line, the population composition numbers of village B are given.

Output Form:
Print the aging ratio for both villages with three decimal places, separated by spaces.
Use string formatting (‘format’ statement).

(Mission for Section 10)

Input Form	Output Form
100 150 230 120 180 100 140 95 81 21 4 300 420 530 420 300 40 5 1 1 1	0.165 0.001

35. The records of daily store sales for three or more days are given. Create a tuple. Then, print the number of days when the sales decreased compared to the previous day.

    Input Form: Three or more natural numbers are given, separated by spaces.

    Output Form: Print the answer.

(Problem of Paper Coding for Section 10)

Input Form	Output Form
100 121 120 130 140 120 122 123 190 125	3

36. Three or more natural numbers are given. Create a tuple. Then, print the most frequently occurring element.
    If there are two or more elements with the same highest frequency, print the largest value among them.
    Caution: Use the count method.

    Input Form: Three or more natural numbers are given, separated by spaces.

    Output Form: Print the answer.

(Problem of Pair Programming for Section 10)

Input Form	Output Form
1 2 5 4 3 2 1 4 7 8 9 9 3 7 3 9	9

Python Course Midterm Exam

37. The following list contains items with elements, and items without elements, which is empty tuples, empty strings, and empty lists: [(), (1,), [], ‘abc’, (), (), (1,), (‘a’,), (‘a’, ‘b’), ((),), ‘’].
    Remove only the empty tuples, empty strings, and empty lists from this list. Then print the resulting list as follows.

(Problem of Pair Programming for Section 10)

[(1,), 'abc', (1,), ('a',), ('a', 'b'), ((),)]

38. Ask the user, 'Do you want to continue the game? ' and accept input 'yes' or 'no'. Until 'no' is entered, the following repeats :
    - Ask the user, 'Choose among scissors, rock, paper> '.
    - If the user enters anything other than 'scissors', 'rock', or 'paper', ask for input again.
    - If you receive input among 'scissors', 'rock', or 'paper', then print the received value.

    If 'no' is entered as an answer to the question, 'Do you want to continue the game?', the repetition ends, and 'Game Over' is printed.

    The code is written using the while loops for the infinite and nested loop, and a list.

(Problem of Key Concept for Section 9)

Input Form	Output Form
Do you want to continue the game? (yes, no): Yes	
Choose among scissors, rock, paper> si	
Choose among scissors, rock, paper> scissors	
	scissors
Do you want to continue the game? (yes, no): no	
	Game Over

39. Use five print statements to output the following triangle shape.

```
#
##
###
####
#####
```

40. Print the process of dividing 10 by 8 and calculating the quotient and remainder. Use the division and modulus operators along with the print statements.

41. There are two variables containing integers 54 and 32, respectively. Write a program to perform arithmetic operations on these variables.
    On the first line, print the process of addition for the two variables.
    On the second line, print the process of subtraction.
    On the third line, print the process of multiplication.
    On the fourth line, print the process of division.

```
86
22
1728
1.6875
```

Python Course Midterm Exam

42. Write a program to perform addition and subtraction operations on two variables, 'a' and 'b', which will receive integer data as input.

    Input Form:
    On the first line, a single integer ‘a’ is given.
    On the second line, a single integer ‘b’ is given.
    The integers are positive integers between 1 and 100.

    Output Form:
    On the first line, print the addition operation for the two input variables.
    On the second line, print the subtraction operation. There should be no spaces when printed.

Input Form	Output Form
54 32	54+32=86 54-32=22

43. Write a program to print the multiplication table for a given positive integer N. (2≤N≤100)

Input Form	Output Form
2	2 4 6 8 10 12 14 16 18

44. Three integers A, B, and C are given. Write a program to perform arithmetic operations on these three integers.

    Input Form:
    Three integers A, B, and C will be given, separated by a single space.
    The integers will be between 1 and 100 (inclusive).

    Output Form:
    On the first line, print the result of the addition operation for the three integers.
    On the second line, print the result of the subtraction operation.
    On the third line, print the result of the multiplication operation.
    On the fourth line, print the result of the division operation.

Input Form	Output Form
6 3 2	11 1 36 1.0

45. Two single characters are given. Write a program to output the ASCII values of the given two characters.

    Input Form:
    Two English alphabet characters will be given, separated by a single space.

    Output Form:
    On the first line, print the first given character and its ASCII code value separated by a colon.
    On the second line, print the second given character and its ASCII code value separated by a colon.

Input Form	Output Form
A Z	A:65 Z:90

Python Course Midterm Exam

46. When five integers are given, write a program to output the cumulative sum of the given integers on each line in sequence.

    Input Form:
    Five integers between 1 and 100 (inclusive) will be given, each on a separate line.

    Output Form:
    On the first line, print the cumulative result of the first input integer.
    On the second line, print the cumulative result of the second input integer. In other words, it is the cumulative result of the second input integer added to the previously accumulated result.
    On the third line, print the cumulative result of the third input integer.
    On the fourth line, print the cumulative result of the fourth input integer.
    On the fifth line, print the cumulative result of the fifth input integer.

Input Form	Output Form
5 8 7 8 11	5 13 20 28 39

Python Course Midterm Exam

47. If S is equal to (R1 + R2) ÷ 2, then we call S the average of two integers R1 and R2.

    To celebrate Euler's birthday, Euler received two integers R1 and R2 as gifts.
    Euler immediately calculated the average of the two numbers, but later lost R2.

    Let's help Euler find the value of R2.

    Input Form: Two integers R1 and S will be given, where -1,000 ≤ R1 ≤ 1,000 and -1,000 ≤ S ≤ 1,000.

    Output Form: Print the value of R2.

Input Form	Output Form
11 15	19

Input Form	Output Form
4 3	2

Python Course Midterm Exam

48. Euler started solving a problem set at A o'clock and B minutes (0≤A≤23, 0≤B≤59). It took exactly C minutes (0≤C≤1,000) to complete the problem set.

    Write a program to find the time when Euler finished solving the problems.

    Input Form:
    On the first line, the starting time of problem-solving is given as A hours and B minutes, separated by a single space.
    On the second line, the required time for problem-solving, C minutes, is given. A, B, and C are integers.

    Output Form:
    Print the time when Euler finished solving the problems in the format hour and minutes separated by a single space.
    Note that the hour should be an integer between 0 and 23, and the minutes should be an integer between 0 and 59. If it's 23 o'clock 59 minutes and one more minute passes, it will change to 0 o'clock 0 minutes.

Input Form	Output Form
6 17 25	6 42

Input Form	Output Form
23 58 22	0 20

Python Course Midterm Exam

49. Euler, who ran out of chess pieces and could no longer play chess, now attempts to cut the chessboard into as many pieces as possible.
    Euler attempts to cut the chessboard with a maximum of N (1≤N≤100) cuts, only cutting horizontally or vertically along the edges of the chessboard (parallel to the edges of the chessboard).

Input Form	Output Form
1	2

Input Form	Output Form
3	6

50. Write a program that determines whether a given positive integer 'a' is even or odd. An even number has a remainder of 0 when divided by 2, while an odd number has a remainder of 1 when divided by 2.

    Input Form: A single positive integer between 1 and 100 will be given.

    Output Form: Print 'odd' if the given integer is odd, and 'even' if it is even.

Input Form	Output Form
7	odd

Input Form	Output Form
8	even

Python Course Midterm Exam

51. Write a program that compares two given numbers, 'a' and 'b', and displays the corresponding inequality sign.

    Input Form: Two numbers 'a' and 'b' will be given, separated by a single space.

    Output Form:
    Print the inequality sign indicating the relationship between the two numbers.
    If 'a' is greater than 'b', print '>', if 'b' is greater than 'a', print '<', and if they are equal, print '='.

Input Form	Output Form
20000 90	>

Input Form	Output Form
90 20000	<

Input Form	Output Form
20000 20000	=

52. Write a program that uses **an if-else statement** to determine whether the sum of two given positive integers 'a' and 'b' is odd or even.

    Input Form: Two positive integers 'a' and 'b' between 1 and 100 will be given, separated by a single space.

    Output Form: Print 'odd' if the sum of the two integers is odd, and 'even' if it is even.

Input Form	Output Form
3 5	even

Input Form	Output Form
1 2	odd

Python Course Midterm Exam

53. Write a program that uses an if-else statement to determine whether the sum of two given positive integers 'a' and 'b' is a natural number or not.

    Input Form: Two integers 'a' and 'b' between -100 and 100 will be given, separated by a single space.

    Output Form: Print 'Natural Number' if the sum of the two integers is a natural number, and '0 or Negative Number' if it is not.

Input Form	Output Form
-4 7	Natural Number

Input Form	Output Form
-4 3	0 or Negative Number

54. Euler plans to have hamburgers for dinner tonight. If there isn't enough money to buy the hamburger, withdraw money from the bank.
    Let's denote the price of one hamburger as P.
    Let's denote the number of hamburgers intended to be purchased as N.
    Let's denote the current amount of money you have as M.
    Write a program to calculate how much money needs to be withdrawn from the bank.

    Input Form:
    Three integers P, N, and M will be given, separated by a single space.
    P and N' are positive integers less than or equal to 1,000.
    M is a positive integer less than or equal to 100,000.

    Output Form: Print the amount of money Euler needs to withdraw from the bank.

Input Form	Output Form
700 3 6000	0

Input Form	Output Form
500 7 2500	1000

Python Course Midterm Exam

55. Euler and Euclid took final exams in four subjects (English, Math, Science, History).

    Given Euler's total score as ‘a’ and Euclid's total score as ‘b’, find the higher score between ‘a’ and ‘b’.
    If 'a' and 'b' are the same, it doesn't matter which one is chosen.

    Input Form:
    On the first line, Euler's four subject exam scores are given, each separated by a single space.
    On the second line, Euclid's four subject exam scores are given, each separated by a single space.
    The scores are positive integers less than or equal to 100.

    Output Form: Print the higher total score between Euler and Euclid.

Input Form	Output Form
91 78 87 100 88 100 89 73	356

56. Write a program that takes a single integer 'a' as input and prints '1 or more and 10 or less' if the given integer is between 1 and 10 (inclusive).
    Otherwise, print 'less than 1 or greater than 10'.

Input Form	Output Form
5	1 or more and 10 or less

Input Form	Output Form
11	less than 1 or greater than 10

Input Form	Output Form
0	less than 1 or greater than 10

57. Two integers 'a' and 'b' are given, separated by a single space.
If either of the two integers is negative, print 'One of a or b is a negative number'. Otherwise, print 'both a and b are zero or more'.

Input Form	Output Form
5 -4	One of a or b is negative number

Input Form	Output Form
5 4	both a and b are zero or more

Input Form	Output Form
0 0	both a and b are zero or more

58. Euler and Euclid bought a watermelon. They want to divide the purchased watermelon into two pieces, each with an even weight. Write a program to determine if this is possible.

Input Form: The weight of the watermelon 'W' will be given. (1≤W≤100)

Output Form:
Print 'YES' if it is possible to divide the watermelon into two pieces with even weights.
Print 'NO' if it is not possible.

Input Form	Output Form
7	NO

Input Form	Output Form
8	YES

59. Euler must securely store a coding spellbook, ensuring it doesn't fall into Voldemort's hands. The safe is equipped with a lock that opens when a four-digit password, consisting of numbers from 0 to 9, is entered.

    Voldemort attempts to steal the coding spellbook by changing one password per day in the following manner: on the first day, the password is 0000, on the next day, it becomes 0001, and so on, until on the last day, it is changed to 9999.

    Euler thought that if he used two different locks alternately every day, Voldemort wouldn't be able to steal them. Euler named the two locks as Lock 1 and Lock 2. On the first day that Voldemort was targeting, Euler used Lock 1, on the next day, Lock 2, and then Lock 1 again, and so on, changing the lock every day.

    Given two passwords for the locks. Write a program to determine whether Euler can protect the coding spellbook from Voldemort.

    Input Form:
    The passwords consist of 4 integers from 0 to 9. On the first line, the password for Lock 1 is given. On the second line, the password for Lock 2 is given.

    Output Form: Print 0 if Euler can protect the spellbook, and 1 if he cannot.

Input Form	Output Form
0001 0002	0

Input Form	Output Form
0002 0001	1

Python Course Midterm Exam

60. Given a score S, write a program to determine the corresponding letter grade.

Score (S)	Grade
90~100	A
80~89	B
70~79	C
60~69	D
~59	F

Input Form: An integer S ranging from 0 to 100 is given.

Output Form: Print the letter grade as an uppercase English alphabet.

Input Form	Output Form
70	C

Input Form	Output Form
80	B

Input Form	Output Form
90	A

Input Form	Output Form
60	D

Input Form	Output Form
59	F

Python Course Midterm Exam

61. The A tribe loves the number 1.
When encountering someone in the jungle, they verify if the person belongs to the A tribe by asking for their favorite number.
Euler, while exploring the jungle, met two individuals and asked them about their favorite numbers.

Write a program to determine if both of them belong to the A tribe.

Input Form:
The two numbers given by the individuals are separated by a single space.
The people encountered in the jungle can only respond with either 0 or 1.

Output Form:
If both individuals belong to the A tribe, print 'both'.
If only one of them belongs to the A tribe, print 'either'.
If neither of them belongs to the A tribe, print 'neither'.

Input Form	Output Form
1 1	both

Input Form	Output Form
1 3	either

Input Form	Output Form
3 7	neither

Python Course Midterm Exam

62. Euler created an arithmetic expression with three integers A, B, and C, along with an equals sign (=) and arithmetic operation signs.
Afterward, only the integers were left, and the equal sign and operators disappeared.

    Write a program to put back the operators and equal sign to complete the arithmetic expression again.

    Input Form: Three positive integers less than 100 are given, separated by a single space.

    Output Form:
    Print an equation containing the three integers in the same order as input, one equals sign, and one arithmetic operation sign.
    If there are multiple possible solutions, you can output any of them.

Input Form	Output Form
5 3 8	5 + 3 = 8

Input Form	Output Form
5 15 3	5 = 15 / 3

Python Course Midterm Exam

63. Inside the magic box, there are magic number cards with integers from 0 to 9. Each number appears on three cards, making a total of 30 cards in the box.

    Euler draws 3 cards from a box and can obtain gold coins according to the following rules. Given the number of number cards as input, print the number of gold coins Euler can receive.

    - Three identical numbers: 10,000 gold coins + (identical number) * 1,000 gold coins
    - Two identical numbers: 1,000 gold coins + (identical number) * 100 gold coins
    - Three different numbers: (largest number) * 100 gold coins

    Input Form: Three numbers representing the numbers on the cards are given, separated by a single space.

    Output Form: Print the number of gold coins Euler can receive.

Input Form	Output Form
8 8 8	18000

Input Form	Output Form
3 3 5	1300

64. At school, they decided to grill ribs for N students. Grilling the ribs requires a frying pan, and it takes 1 minute to grill one side. Both sides need to be grilled to make them edible. The school has only one frying pan, which can grill K ribs simultaneously. Calculate the total time it takes for the chef to grill all the ribs.

    Input Form: N and K are given, separated by a single space. (1≤N, K≤1,000)

    Output Form: Print the time (in minutes) it takes to grill all the ribs for N students.

Input Form	Output Form
3 2	3

Python Course Midterm Exam

65. Given a positive integer N, write a program to print numbers from 1 to N.

    Input Form: A positive integer N is given. (1 ≤ N ≤ 100)

    Output Form: Print the integers from 1 to N **in ascending order**, separated by a single space.

Input Form	Output Form
13	1 2 3 4 5 6 7 8 9 10 11 12 13

66. Write a program to find all sets of three different integers between 1 and 10 (inclusive) whose sum is N.

    Input Form: The sum N is given. (3 ≤ N ≤ 30)

    Output Form:
    Each set should contain three distinct integers, and each set should be printed only once.
    The sets should be printed in ascending order of the first number, then the second number, and finally the third number. (If the first numbers are the same, then the sets should be ordered by the second number. If the second numbers are also the same, then the sets should be ordered by the third number.)
    Print the total number of valid sets at the end.

Input Form	Output Form
10	1 2 7 1 3 6 1 4 5 2 3 5 4

Python Course Midterm Exam

67. Write a program to print all positive integers from 'a' to 'b' (1 ≤ a ≤ b ≤ 100).

    Input Form: Two positive integers 'a' and 'b' are given, separated by a single space.

    Output Form: **Print the integers from 'a' to 'b' in ascending order**, each separated by a single space.

Input Form	Output Form
3 8	3 4 5 6 7 8

68. Write a program to print all positive integers from 'b' to 'a' (1 ≤ a ≤ b ≤ 100).

    Input Form: Two positive integers 'a' and 'b' are given, separated by a single space.

    Output Form: **Print the integers from 'b' to 'a' in descending order**, each separated by a single space.

Input Form	Output Form
3 8	8 7 6 5 4 3

69. Given a positive integer N (1 ≤ N ≤ 100), write a program to calculate the expression: (1 x N) + (2 x (N - 1)) + ... + ((N - 1) x 2) + (N x 1).

Input Form	Output Form
10	220

Python Course Midterm Exam

70. Given a positive integer N (1 ≤ N ≤ 100), write a program **using the 'range' and 'sum' functions** to calculate the total sum from 1 to N.

Input Form	Output Form
100	5050

71. Given two positive integers a and b (1 ≤ a ≤ b ≤ 100) separated by a space, write a program **using the 'sum' and 'range' functions** to calculate the total sum from a to b (inclusive).

Input Form	Output Form
51 100	3775

72. Given a positive integer N (1 ≤ N ≤ 100), write a program to print the odd numbers from 1 to N **using the 'step' parameter of the 'range' function.**

Input Form	Output Form
11	1 3 5 7 9 11

73. Given a positive integer N (1 ≤ N ≤ 100), write a program to calculate the number of divisors of N.

Input Form	Output Form
12	6

Python Course Midterm Exam

74. Write a program to calculate the sum of integers that are multiples of 3 or 5 and are greater than or equal to 1 and less than N (1 ≤ N < 1,000).

    For example, if N is 10, the integers that are multiples of 3 or 5 and less than 10 are 3, 5, 6, and 9, and their sum is 23.

Input Form	Output Form
10	23

75. Write a program to calculate the sum of divisors of a given integer N (1 ≤ N < 1,000,000).

    For example, if N is 12, the divisors of 12 are 1, 2, 3, 4, 6, and 12, and their sum is 28.

Input Form	Output Form
12	28

76. Given an integer N (1 ≤ N < 2,000,000,000), write a program to count **how many positive integers** less than N can be expressed as t**he product of two even numbers.**

    For example, among positive integers less than 10, there are 4 (= 2 × 2) and 8 (= 2 × 4) that can be expressed in this way.

Input Form	Output Form
10	2

Python Course Midterm Exam

77. For a positive integer, if the sum of all its divisors excluding itself is equal to the number itself, it is called a 'perfect number'. If the sum of its divisors is less than the number itself, it is called a 'deficient number'. If the sum of its divisors is greater than the number itself, it is called an 'abundant number'.

    Given a positive integer N (1 ≤ N ≤ 10,000), print 'PERFECT' if N is a perfect number, 'DEFICIENT' if N is a deficient number, and 'ABUNDANT' if N is an abundant number.

Input Form	Output Form
6	PERFECT

Input Form	Output Form
12	ABUNDANT

Input Form	Output Form
10	DEFICIENT

78. Using a for loop, print the following triangle shape.

```
#
##
###
####
#####
```

79. Using a for loop, print the following triangle shape.

```
#####
####
###
##
#
```

Python Course Midterm Exam

80. Using a for loop, print the following triangle shape.

```
    #
   ##
  ###
 ####
#####
```

81. Using a for loop, print the following triangle shape.

```
#####
 ####
  ###
   ##
    #
```

82. Using a for loop, print the following triangle shape.

```
    #
   ###
  #####
 #######
#########
```

83. Using a for loop, print the following triangle shape.

```
#########
 #######
  #####
   ###
    #
```

84. There are 10 each of 2g, 3g, and 5g weights. Measure the weight G (1≤G≤50) using one or more of these weights.
Find all possible combinations that satisfy the weight G and output the number of each weight used.

Input Form: An integer G is given, representing the weight to measure. G is a positive integer between 1 and 50 (unit: grams).

Output Form:
Print the number of 2g, 3g, and 5g weights used in each case. (The case with the smallest number of 2g weights is printed first. If the number of 2g weights is the same, then the case with the smallest number of 3g weights is printed first. If both the number of 2g and 3g weights are the same, then the case with the smallest number of 5g weights is printed first.)
After outputting all cases, print the total number of cases.
If there are no possible combinations, print "0" on the first line of the output.

Input Form	Output Form
20	1 1 3 2 2 2 3 3 1 6 1 1 4

85. Write a program to print a butterfly pattern as shown below, given the size N (1≤N≤10). The butterfly pattern for N=5 is shown as an example. If N is 10, the center number should be printed as 0 instead of 10.

Input Form	Output Form
5	1 1 12 21 123 321 1234 4321 123454321 1234 4321 123 321 12 21 1 1

Python Course Midterm Exam

86. Euler has a transportation card with a balance of 10,000 won. The bus fare is A won for each ride. Euler wants to know how many times he can take the bus using this transportation card. Write a program to calculate the remaining card balance after each bus ride and the total number of rides taken.

    Input Form: One integer A is given. (1≤A≤10,000)

    Output Form:
    Print the remaining balance on the transportation card after each ride on separate lines.
    Print the total number of times the transportation card was used on the last line.

Input Form	Output Form
1250	8750 7500 6250 5000 3750 2500 0 8

87. To receive bids for an antique at an auction, engage in price negotiations.
    If the price you initially offer, 'a', is the same as the price offered by the seller, 'c', then you will receive bids for the antique at that price. However, if they are not the same, the price you offered increases by 'b' each time, and the price offered by the seller decreases by 'd'.
    The price is determined when the two prices become equal, or when our offered price becomes higher than the seller's offered price. The seller will not offer a price lower than our initial offer. Write a program to determine the final bidding price.

    Input Form: Four positive integers a, b, c, and d are given separated by a single space. (a, b, c, d ≤ 10,000)

    Output Form: Print the final bidding price.

Input Form	Output Form
150 50 1000 100	450

Python Course Midterm Exam

88. Euler has N bottles of cola.
After drinking all the colas, Euler keeps the empty bottles.
When collecting K empty bottles, Euler can exchange them for a new bottle of cola.

What is the maximum number of colas that Euler can drink?

Input Form: Two integers N and K are given separated by a single space.
(1≤N≤1,000,000,000) (K>1)

Output Form: Print the answer.

Input Form	Output Form
4 3	5

Input Form	Output Form
10 3	14

89. The king is sharing coins with his loyal knight.
On the first day, the knight receives one coin.
Over the next two days, the knight receives two coins each day.
For the next three days (4th to 6th day), the knight receives three coins each day.
For the following four days (7th to 10th day), the knight receives four coins each day.
The king continues this pattern of sharing coins every day.

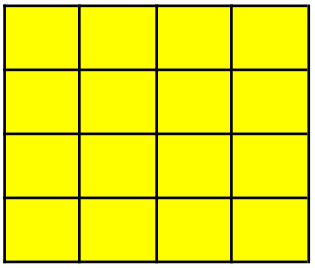
Given a consecutive number of days N (1≤N≤10,000), find the total number of coins the knight receives.

Input Form	Output Form
10	30

Python Course Midterm Exam

90. Given the length N (1≤N≤100) of a side of a square, write a program to calculate the total number of squares, including both larger and smaller squares.

    For example, if the side length is 4, there are a total of 30 squares (16 squares with a side length of 1, 9 squares with a side length of 2, 4 squares with a side length of 3, and 1 square with a side length of 4).



Input Form	Output Form
4	30

91. Euler likes odd numbers. So, starting from a certain day, Euler began collecting odd numbers.
    On the first day, Euler collected the smallest odd number among positive integers.
    On the second day, Euler collected the smallest and the second smallest odd numbers among positive integers, and so on.
    On the Nth day, Euler collected the smallest odd number up to the Nth smallest odd number among positive integers.

    The odd numbers collected by Euler up to the Nth day are as follows:

    1 + (1+3) + (1+3+5) + (1+3+5+7) + ... + (1+3+5+7+...+2xN+1)

    Print the total sum of all the odd numbers collected by Euler up to the Nth day.

Input Form	Output Form
3	14

92. A perfect square, also known as a square number, is an integer that is the square of an integer.
Two integers A and B (1≤A≤B≤10,000) are given.

Among the integers from A to B (inclusive), find all the perfect square numbers, calculate their sum, and print it on the first line.
Also, print the smallest perfect square number among them on the second line.

If there are no perfect square numbers in the given range, print -1.

Input Form	Output Form
1 100	385 1

Input Form	Output Form
50 60	-1

93. In a long row of N locked prison cells, each cell contains one prisoner.
One night, the prison guard decides to play a game out of boredom. In the first round, he drinks whiskey and opens all the locked prison cells.
In the second round, after drinking again, he locks every 2nd cell (2, 4, 6, 8, ...).
In the third round, after another drink, he visits every 3rd cell (3, 6, 9, 12, ...) and toggles the lock - if the cell is locked, he opens it, and if it's open, he locks it again.
He repeats this game for N rounds.

After completing the game, the guard leaves, and the prisoners in the open cells escape.
Given the number of prison cells, determine how many prisoners will escape after N rounds.

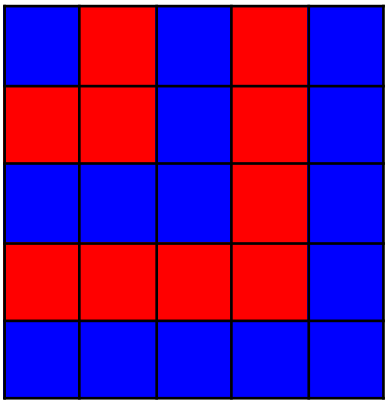
Input Form: One positive integer N is given.

Output Form: Print the answer.

Input Form	Output Form
5	2

Python Course Midterm Exam

94. Euler wants to attach tiles of different colors, blue and red, to a wall.
The tiles are square-shaped.



If a total of 25 tiles fit on the wall, then 15 blue tiles are needed, consisting of 1+5+9 tiles, and 10 red tiles are needed, consisting of 3+7 tiles.
Now, Euler wants to attach a total of N (1≤N≤2,000,000,000) tiles to the square-shaped wall. Find the difference between the number of blue tiles and the number of red tiles required.
Caution: **Use the math module** for your solution.

Input Form	Output Form
25	5

95. A palindrome number is a number that reads the same both forward and backward, such as 121.
One integer N between 1 and 1,000 is given. If N is a palindrome number, output 'Palindrome Number'. Otherwise, output 'Normal Number'.

Input Form	Output Form
121	Palindrome Number

Input Form	Output Form
120	Normal Number

96. Print all prime numbers from 1 to 100, separated by a single space, with 5 numbers per line, in ascending order.

```
2 3 5 7 11
13 17 19 23 29
31 37 41 43 47
53 59 61 67 71
73 79 83 89 97
```

97. Print even numbers from 1 to 100 and accumulate them. If the accumulated sum becomes greater than 50, forcefully exit the loop **using the break statement**, then print the total sum of the accumulated numbers so far.
    On the first line, print the accumulated even numbers in ascending order with a single space separating them.
    On the second line, output the total sum.

```
2 4 6 8 10 12 14
56
```

98. Receive two integers A and B (0≤A≤B≤100) from the user and calculate their sum. Output the largest sum among the sums of the two integers A and B.

    Input Form:
    Each command consists of two integers A and B separated by a single space, given on each line.
    If both A and B are 0, there will be no further input.

    Output Form:
    Print the maximum value among the sums of the given two integers.

Input Form	Output Form
1 2 2 3 3 4 4 5 0 0	9

Python Course Midterm Exam

99. Write a program to print integers from 1 to 100, excluding multiples of 2 and 3, **using the continue statement**.
Print the integers in ascending order, separated by a single space, on the first line.

```
1 5 7 9 11 13 17 19 23 25 29
31 35 37 41 43 47 49 53 55 59
61 65 67 71 73 77 79 83 85 89
91 95 97
```

100. Euler loves basketball very much. Euler considers a day to be a happy day if the total goals scored is more than 8, combining the first and second halves of the match. Given the recent basketball match results in chronological order, find out on which days Euler was happy.

Input Form:
For each day, two non-negative integers are given separated by a space. The first integer represents the number of goals scored during the first half, and the second integer represents the number of goals scored during the second half. The two integers provided as input are both non-negative integers less than 10.
If both the first and second halves have 0 goals scored, there will be no further input.

Output Form: Print the days when Euler was happy.

Input Form	Output Form
5 3 6 2 7 2 5 3 5 4 0 4 0 6 0 0	3

Python Course Midterm Exam

101. Write a program to initialize a list with 10 data elements 4, 7, 6, 8, 11, -3, 8, 11, 5, 13 and calculate the sum of all elements.

70

102. Write a program to initialize a list with 10 data elements 5, 7, 13, 11, 6, 10, 45, 11, 4, 9 and calculate the sum of even numbers.

20

103. You are trying to set the number of pieces for a chessboard. The original number of pieces that should be on the chessboard is as follows: 1 king, 1 queen, 2 rooks, 2 bishops, 2 knights, and 8 pawns.

Input Form:
Six integers between 1 and 10 are given.
Each number represents the current number of kings, queens, rooks, bishops, knights, and pawns you have.

Output Form:
For each piece, in the order given in the input, output the number of pieces to be added or removed.
If you need to add more pieces, output a positive integer.
If you need to remove pieces, output a negative integer.

Input Form	Output Form
0 1 2 2 2 7	1 0 0 0 0 1

Input Form	Output Form
2 1 2 1 2 1	-1 0 0 1 0 7

Python Course Midterm Exam

104. Three positive three-digit integers A, B, and C are given separated by a space. Calculate the result of the product of three numbers, A x B x C and print the frequency of each digit from 0 to 9 on separate lines.
For example, if A = 123, B = 234, and C = 345, then A * B * C is 9,929,790. In this number, 1, 3, 4, 5, 6, and 8 appear 0 times, 0, 2, and 7 appear 1 time, and 9 appears 4 times.

Input Form	Output Form
123 234 345	1 0 1 0 0 0 0 1 0 4

105. Initialize a tuple with 50 data elements **using the 'range' function** with values 1, 3, 5, 7, 9, ..., 97, 99.
Then, calculate the sum of all elements in the tuple and print the result.

2500

106. The operation of sending the value of the first element of the list to the value of the last element, and moving the values of the remaining elements one by one to the value of their left index is called Left Shift.

Initialize a list with 10 data elements as 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
Then shift one position to the left and print.

[2, 3, 4, 5, 6, 7, 8, 9, 10, 1]

107. The operation of sending the value of the last element of the list to the value of the first element, and moving the values of the remaining elements one by one to the value of their right index is called Right Shift.

Initialize a list with 10 data elements as 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
Then shift one position to the right and print.

[10, 1, 2, 3, 4, 5, 6, 7, 8, 9]

108. Write a program that takes a date as input and separates it into year, month, and day.

Input Form:
An 8-digit integer is given.
The first 4 digits represent the year, the next 2 digits represent the month, and the last 2 digits represent the day. If the month or day is a single-digit integer, add a leading zero.

Output Form:
Print the year, followed by an uppercase Y and a space.
Print the month, followed by an uppercase M and a space.
Print the day, followed by an uppercase D.

Input Form	Output Form
20211224	2021Y 12M 24D

Python Course Midterm Exam

109. In a contest, participants can advance to the next round if their score is not zero and is greater than or equal to the score of the K-th participant.

The scores of N participants are given.
Write a program to print the number of participants who can advance to the next round.

Input Form:
On the first line, one integer N and K (1≤K≤N≤50) are given, separated by a single space.
On the second line, scores for N participants are given in the order of participation, separated by spaces.

Output Form: Print the answer.

Input Form	Output Form
8 5 10 9 8 7 7 7 5 5	6

Input Form	Output Form
4 2 0 0 0 0	0

110. Euler receives X MB of data from the telecommunication company every month. Any remaining unused data is carried over to the next month.

Given the amount of data used for N months, find the amount of data available in the (N + 1)-th month.

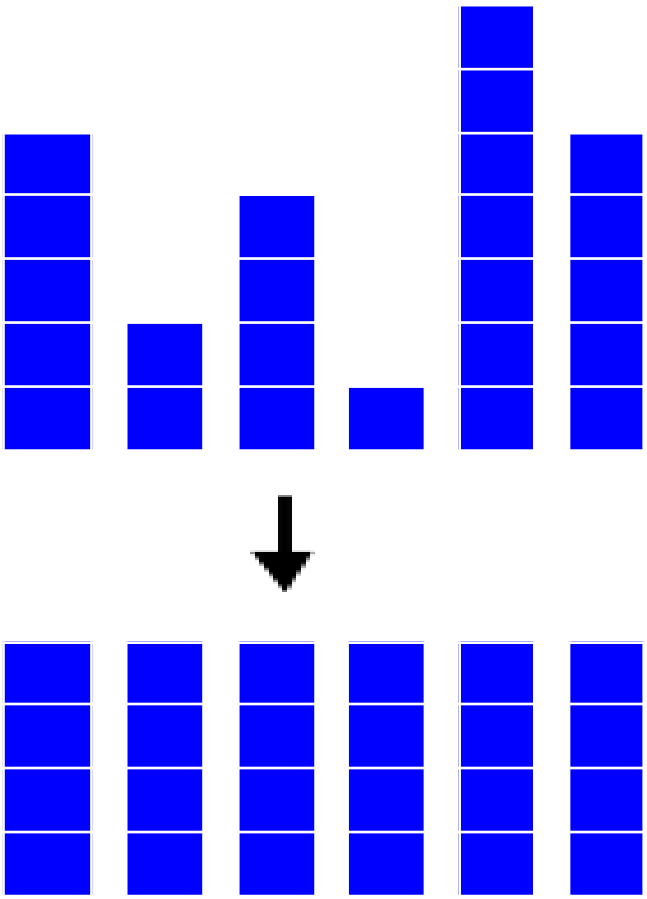
Input Form:
On the first line, X (1≤X≤100) is given.
On the second line, a single integer N (1≤N≤100) is given.
From the third line to the N+2-th line, the amount of data used by Euler in each month is given as N integers in order.

Output Form: Print the answer.

Input Form	Output Form
10 3 4 6 2	28

Python Course Midterm Exam

111. Several blocks of the same size are stacked on top of each other to form different piles with different heights. To make the heights of all block piles equal, the minimum number of blocks needs to be moved.



Input Form:
On the first line, the number of block piles N is given.
On the second line, the heights of each block pile are given, separated by spaces.
(The total number of blocks will always be divisible by the number of block piles. Hence, you can always rearrange the blocks to make all piles have the same height.)

Output Form: Print the minimum number of blocks K needed to make all block piles have the same height.

Input Form	Output Form
6 5 2 4 1 7 5	5

Python Course Midterm Exam

112. Euler finds a newly learned arithmetic operation in math class interesting. First, create a sequence A composed of integers. Then, using the first sequence A, create another sequence B composed of the average values of sequence A.
For example, if sequence A is composed of 1, 5, 3, 7, 9, sequence B would be 1÷1, (1+5)÷2, (1+5+3)÷3, (1+5+3+7)÷4, (1+5+3+7+9)÷5, which results in 1, 3, 3, 4, 5.
Given sequence B, write a program to calculate sequence A.

Input Form:
On the first line, a single integer N (1≤N≤100) is given, representing the length of sequence B.
On the second line, integers B□ (1≤B□≤10^9) corresponding to sequence B are given. The integers are separated by a single space, and there are N of them.

Output Form:
Print the integers that correspond to sequence A, separated by a single space.

Input Form	Output Form
5 1 3 3 4 5	1 5 3 7 9

113. A list of 2 or more but not more than 15 distinct positive integers is given. Within this list of integers, determine how many multiples of 2 are present for each integer.

Input Form:
A list of 2 or more but not more than 15 distinct positive integers will be given.
The elements of the list are positive integers not greater than 99.
The last input will be the integer 0, which does not belong to the list.

Output Form:
Print the count of multiples of 2 within the list for each integer.
For instance, about element 1, the multiples of 2 are 2. About element 2, the multiples of 2 are 4. Similarly, about element 9, the multiples of 2 are 18. Therefore, the answer is 3.

Input Form	Output Form
1 4 3 2 9 7 18 22 0	3

Python Course Midterm Exam

114. Two positive integers P (1≤P≤6,000) and Q (1≤Q≤6,000) are given. Find all coordinates (x, y) that have P as a divisor for the x-coordinate and Q as a divisor for the y-coordinate.
For example, if P = 24 and Q = 2 are given: Divisors of P = 24 are 1, 2, 3, 4, 6, 7, 12, 24. Divisors of Q = 2 are 1, 2. So, possible coordinates are (1, 1), (2, 1), (3, 1), ...

Input Form: P and Q are given separated by a space.

Output Form:
Print the x-coordinate and y-coordinate separated by a space on each line.
Print the coordinates in ascending order of x-coordinates. If x-coordinates are the same, print them in ascending order of y-coordinates.

Input Form	Output Form
24 2	1 1 1 2 2 1 2 2 3 1 3 2 4 1 4 2 6 1 6 2 8 1 8 2 12 1 12 2 24 1 24 2

115. We have come up with a new multiplication method. It involves pairing each digit of number A with each digit of number B, multiplying them, and then summing up all the results. For example, for the numbers 123 and 45, the calculation would be: (1 x 4) + (1 x 5) + (2 x 4) + (2 x 5) + (3 x 4) + (3 x 5) = 54.
Two numbers A and B (1≤A,B≤1,000,000,000) are given separated by a space. Calculate the product of the two numbers using this new method.

Input Form	Output Form
123 45	54

116. There is a list containing 10 data points: 7, -5, 4, -99, 45, 11, 0, 8, 50, 77.
Print the maximum value on the first line, the minimum value on the second line, and the total sum on the third line.

```
77
-99
98
```

117. Nine different positive integers are given.
Find the largest number among the given positive integers and its position.

Input Form: From the first line to the ninth line, one positive integer less than 100 is given per line.

Output Form:
On the first line, print the maximum value.
On the second line, print the index at which the maximum value is located.

Input Form	Output Form
10 20 30 40 50 60 70 80 90	90 9

Python Course Midterm Exam

118. There is a cooking competition where five chefs compete to showcase their cooking skills.
Each chef can receive scores from 1 to 5 points from four judges for their dishes.
The chef with the highest total score from the four judges wins the competition.

Find out who the winner is and how many points the winner scored.

Input Form:
The input consists of five lines in total.
Each line contains scores from four judges, ranging from 1 to 5, separated by a space.

Output Form:
Print the number of the chef who received the highest score and how many points the winner scored, separated by a space.

Input Form	Output Form
5 4 4 5 5 4 4 4 5 5 4 4 5 5 5 4 4 4 4 5	4 19

Input Form	Output Form
4 4 3 3 5 4 3 5 5 5 2 4 5 5 5 1 4 4 4 4	2 17

Python Course Midterm Exam

119. A survey was conducted among N people to find their favorite numbers, and the results were tabulated in ascending order.

Write a code to find and print the number that most people like among the given data.

Input Form:
One integer N is given on the first line. (1≤N≤20,000)
From the second line to the Nth line, the favorite numbers of citizens are given **in ascending order**, one number per line.

Output Form: Print the answer.

Input Form	Output Form
5 512 532 532 585 599	532

120. Euler, the king knows his sons' intelligence scores: the range of integers from -3 to 3, including -3 and 3.
The king understands that defeating the barbarians depends on the sum of the squares of the intelligence scores of his sons who serve as generals.

The king needs to select his sons appropriately to maximize the sum of their intelligence scores as generals.

Write a program to help the king with the proper calculations.

Input Form:
On the first line, an integer is given, representing the number of the king's children, which does not exceed 100.
On the second line, positive integers, not exceeding 3, are given. They represent the exponents to raise the intelligence scores of his sons to defeat the barbarians.
On the third line, the intelligence scores of the king's sons are given. The absolute value of their intelligence scores is not greater than 3.

Output Form:
Print the maximum sum of the intelligence scores of his sons selected as generals to defeat the barbarians.

Input Form	Output Form
3 3 2 -1 1	9

Python Course Midterm Exam

121. Euler went to the store to buy three dice to play a game. Each of the three dice has S_1, S_2, and S_3 faces, respectively.
A dice with S□ faces has distinct numbers from 1 to S□ on its faces.
Euler wants to find all possible sums of the three dice when rolled together.
The number of sides on three dice is given. Find the sum of the three dice with the highest occurrence.

Input Form:
Three integers S_1, S_2, and S_3 are given, separated by spaces. ($2 \le S_1, S_2, S_3 \le 20$)

Output Form:
Print the most frequently occurring sum of the three dice.
If multiple sums have the same frequency, choose the minimum sum among them.

Input Form	Output Form
3 2 3	5

122. Euler has an amount of money C and wants to buy two items from the kingdom's shops. We have surveyed all the prices of the shops in the kingdom. Now we need to find which two shops sell items with prices exactly equal to C.

Input Form:
On the first line, a positive integer C ($1 \le C \le 1{,}000$) is given, representing the amount of money Euler has.
On the second line, a positive integer N ($3 \le N \le 2{,}000$) is given, representing the number of shops.
On the third line, the prices of items sold at each shop are given in the order of shop numbers.

Output Form:
Print the numbers of the two shops where the prices of the items are exactly equal to C, separated by a single space, prioritizing the shops with smaller numbers.

Input Form	Output Form
100 3 5 75 25	2 3

Python Course Midterm Exam

123. Euler and Euclid are traveling together. However, their car's speedometer is broken, and they don't know how far they have traveled. Fortunately, Euler has a stopwatch and was able to record the car's speed at different times, a total of N (1≤N≤10) measurements. Unfortunately, the measurement times were not constant. Now they hope that you can calculate how far they have traveled.

For example, their speed measurements at different times are as follows:

Speed(km/hours)	Total elapsed time
20	2
30	6
10	7

They drove at a speed of 20 km per hour for a total of 2 hours. Then, for 4 hours (6 - 2 = 4), they drove at a speed of 30 km per hour. Afterward, for 1 hour (7 - 6 = 1), they drove at a speed of 10 km per hour.
The total distance they traveled is 2 x 20 + 4 x 30 + 1 x 10 = 40 + 120 + 10 = 170 km.

Input Form:
On the first line, a single positive integer N is given.
From the second line, N lines of input follow, each containing an integer S (1≤S≤90) representing the speed in kilometers per hour and an integer T (1≤T≤12) representing the total elapsed time. The values of T are always given in ascending order.

Output Form: Print the total distance Euler and Euclid traveled. (Unit: km)

Input Form	Output Form
3 20 2 30 6 10 7	170

Input Form	Output Form
2 60 1 30 5	180

Python Course Midterm Exam

124. 1 to 30 students were assigned numbers in order. Among the 30 students, 28 of them have completed their homework, but 2 students have not finished it yet.
Given the numbers of students who have completed the homework, find and print the numbers of students who have not finished it yet, each on a separate line.

Input Form:
The input consists of 28 lines in total.
Each line contains a positive integer between 1 and 30 (inclusive), representing the student number of a student who has completed their homework. (The student numbers given in the input are not necessarily in ascending order.)

Output Form:
The output consists of two lines in total.
The student number printed on the first line must be smaller than the student number printed on the second line.

Input Form	Output Form
3 1 4 5 7 9 6 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	2 8

Python Course Midterm Exam

125. Given an integer A, calculate the remainder when divided by 42.
Find how many different remainders are there among the 10 non-negative integers A.

Input Form: Ten non-negative integers A are given, one per line. (0≤A≤1,000)

Output Form: Print the answer.

Input Form	Output Form
0 1 2 3 4 5 6 7 8 9	10

Input Form	Output Form
42 84 252 420 840 126 42 84 420 126	1

Python Course Midterm Exam

126. Euler plans to plant flowers along a fence with S (7≤S≤10,000) empty slots (Slots). Each flower starts planting from its designated slot and continues with a fixed interval between slots.
Euler plans to plant N (1≤N≤100) flowers, and each flower will start planting from slot A (1≤A≤S) and proceed with an interval of B (1≤B≤S) slots.
Find out how many empty slots remain after planting all the flowers.

For example, if Euler plants flowers as follows:
30 3 [There are a total of 30 slots, and 3 types of flowers.]
1 3 [Roses start planting from slot 1 with an interval of 3 slots.]
3 7 [Begonias start planting from slot 3 with an interval of 7 slots.]
1 4 [Daisies start planting from slot 1 with an interval of 4 slots.]

Then the layout of the garden will be as follows:
Initial state of the garden:

Next, the state of the garden after planting roses:

R			R			R			R			R			R			R			R			R			R		

Next, the state of the garden after planting begonias:

R		B	R			R			R			R			R	B		R			R		B	R			R		

Next, the state of the garden after planting daisies:

R		B	R	D		R		D	R			R			R	B		R		D	R		B	R			R	D	

Input Form:
On the first line, two integers S and N are given.
Starting from the second line, information about each i-th flower is given over N lines.
Therefore, information about the i-th flowers is given on the i+1-th line.
Each flower's information is given as two integers A_i and B_i.

Output Form: Print the number of remaining empty slots after planting all the flowers.

Input Form	Output Form
30 3 1 3 3 7 1 4	13

Python Course Midterm Exam

127. There are N (2≤N≤500) Christmas lights numbered from 1 to N that will illuminate the city. In the early evening, all the lights are off.

Euler controls all the Christmas lights using N push buttons, each capable of toggling (turning on or off) the corresponding light.
When button i is pressed and the light i is off, it turns on, and if it is on, it turns off.

Euler will perform M operations to manipulate the buttons. Each operation consists of three integers.

The first integer 0p represents the type of operation for the button (0≤0p≤1).
If the first integer 0p is **0** and two integers S_i and E_i are given, S_i represents the start **button**, and E_i represents the end **button**. Euler will press all the buttons from S_i to E_i (1≤S_i≤E_i≤N) exactly once .
If the first integer 0p is **1** and two integers S_i and E_i are given, S_i represents the start **light**, and E_i represents the end **light**. Euler will output the number of lights that are on from S_i to E_i (1≤S_i≤E_i≤N).

Perform all the operations accurately.

For example, when there are four lights (off = 0, on = 1) and five operations, the processing steps are as follows:

	light 1	light 2	light 3	light 4
start	0	0	0	0
operation: 0 1 2	1	1	0	0
operation: 0 2 4	1	0	1	1
operation: 1 2 3	1			
operation: 0 2 4	1	1	0	0
operation: 1 1 4	2			

Python Course Midterm Exam

Input Form:
On the first line, two integers N and M are given.
Starting from the second line, M lines are given, each containing three integers separated by a single space: 0p, S_i, and E_i.

Output Form:
Print the number of lights that are turned on for each question in the order they are given, one per line.

Input Form	Output Form
4 5 0 1 2 0 2 4	
1 2 3	1
0 2 4	
1 1 4	2

Python Course Midterm Exam

128. It's Christmas season. There are M street lamps placed along a long road of N meters. The distance is numbered from 1 to N with a 1-meter interval.
Each street lamp is located at a specific point on the road and can illuminate from left to K meters and from right to K meters brightly. In other words, if a street lamp is placed at point X on the road, it can brightly illuminate from point X - K to point X + K.
Of course, multiple street lamps are not needed to illuminate a single point on the road. Also, there are no street lamps placed at the same location.
The problem is that not all points from 1 to N on the road are illuminated by the street lamps. Our task is to find the minimum number of additional street lamps needed to illuminate all points of the road brightly.

Input Form:
On the first line, one integer N (1≤N≤1,000) is given.
On the second line, one integer M (1≤M≤N) is given.
On the third line, one integer K (0≤K≤N) is given.
Starting from the fourth line, M lines are given, each containing an integer.
Each integer represents the position of a streetlight and is given in ascending order, indicating the locations of M streetlights.
There will be no duplicate positions, and the distance between consecutive streetlights will be between 1 and N (inclusive).

Output Form:
Print the minimum number of additional street lamps needed to illuminate all points of the road brightly.

Input Form	Output Form
5 2 2 1 5	0

Input Form	Output Form
13 2 10 1 2	1

Python Course Midterm Exam

129. There are many trees planted along the road starting from the east entrance. The trees are planted at a 1-meter interval from the beginning of the road. With the construction of subway stations, overpasses, buildings, etc., the trees in this section will be cut down or moved. Our task is to determine how many trees remain after all the trees have been cut down.

For example, if the length of the road is 300 meters and the trees are planted at 1-meter intervals starting from 0 meters, there will be a total of 301 trees along the road. If a subway station is to be constructed in the 100 to 200-meter section, only 200 trees will remain.

Input Form:
On the first line, two integers L (1≤L≤2,000,000,000) and M (1≤M≤5,000) are given, representing the length of the road and the number of allocated segments for construction, respectively.
Starting from the second line, M lines are given, each containing a segment.
Each segment is represented by two non-negative integers, Start and End, indicating the starting and ending points of the segment (0≤Start≤End≤L).
There will be no overlapping segments in the input.

Output Form: Print the number of trees remaining along the road.

Input Form	Output Form
300 1 100 200	200

Input Form	Output Form
5 2 1 2 4 5	2

Python Course Midterm Exam

130. Euler has three cars. Tonight, he needs to park all three cars.
To park a car, he must pay a parking fee.

If he parks only one car, the fee is A won per hour.
If he parks two cars simultaneously, each car must pay B won per hour.
If he parks all three cars simultaneously, each car must pay C won per hour.

Find the total parking fee Euler needs to pay to park the three cars.

Input Form:
On the first line, three integers A, B, and C are given, representing the amounts to be paid for parking. ($1 \le C \le B \le A \le 100$)
From the second line to the fourth line, two integers representing the time a car entered and left the parking lot are given on each line.
The entry and exit times will be given as whole hours and will be integers between 1 and 100.

Output Form: Print the total parking fee required to park the three cars.

Input Form	Output Form
5 3 1 1 6 3 5 2 8	33

Input Form	Output Form
10 8 6 15 30 25 50 70 80	480

Python Course Midterm Exam

131. Initialize the list ‘a’ with 10 data elements: 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100.
Then, given the starting interval A and the ending interval B, find the sum of the elements in the list ‘a’, $\sum_{k=A}^{B} a[k]$.

$\sum_{k=A}^{B} a[k]$ = a[A] + a[A + 1] + … + a[B - 1] + a[B] (A≤B)

Input Form:
On the first line, a positive integer T is given, representing the number of test cases. (1 ≤ T ≤ 5)
From the second line to the Tth line, the range of intervals to be calculated, A□ and B□, are given. (1 ≤ A□ ≤ B□ ≤ 5)

Output Form: Print the answers to each query on T lines, one line per test case.

Input Form	Output Form
3 5 9 1 10 3 8	350 550 330

Python Course Midterm Exam

132. Euler created the following puzzle to calculate the sum of food consumed by citizens during a specific period.

Euler provided food H_i(1≤H_i≤1,000) to the citizens for N(4≤N≤50,000) days.

Euler also created Q(1≤Q≤50,000) puzzles.
Each puzzle consists of pairs S_j and E_j(1≤S_j≤E_j≤N).
S_j represents the first date of food supply, and E_j represents the last date of food supply.

Find the sum of all food supplies from S_j to E_j.

Input Form:
On the first line, two integers N and Q are given.
From the second line, the food supply H_i is given in order of dates for N lines.
Starting from the N + 2 line, pairs of questions S_j and E_j are given for Q lines.

Output Form:
For each question, output the sum of food supplies from S_j to E_j on Q lines.
Print the answers in the order of the questions.

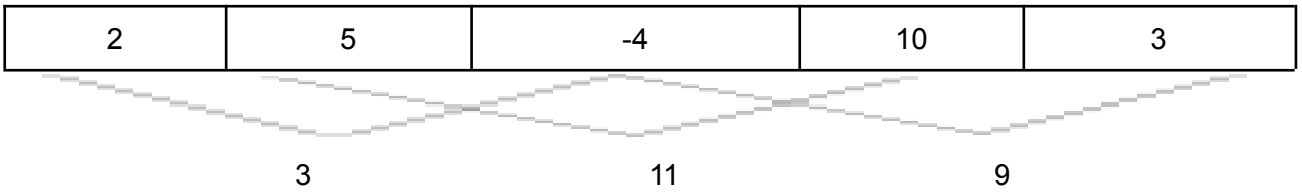
Input Form	Output Form
4 2 5 8 12 6 1 3 2 4	25 26

Python Course Midterm Exam

133. A sequence of N (1≤N≤100,000) integers, a_1, a_2, a_3, …, a_n, are given. And a positive integer K (1≤K≤N) is given.

Find the maximum sum of K consecutive integers in the given sequence.

For example, for the sequence below, if K is 3, the maximum sum of consecutive K integers, denoted as S_i, would be 11.



Input Form:
On the first line, two integers N and K are given.
From the second line, N integers of the sequence a_i (-10,000≤a_i≤10,000) are given, each on a separate line.

Output Form: Print the maximum value of S_i.

Input Form	Output Form
5 3 2 5 -4 10 3	11

Python Course Midterm Exam

134. In a math problem given to Euler, three integers A, B, and C are provided, ranging from 1 to 1,000.

The operations to be performed are addition, subtraction, multiplication, and division.

The operations are performed sequentially, **regardless of operator precedence**.
For example, for the expression "4 + 5 * 9," it is computed as "(4 + 5) * 9 = 9 * 9 = 81".

Also, the division operation results in only the quotient without any remainder. For example, "7 / 3 = 2".

Input Form:
On the first, third, and fifth lines, integers A, B, and C are given, respectively.
On the second and fourth lines, one of the four arithmetic operators (+, -, *, /) is given.

Output Form: Print the result of the operations.

Input Form	Output Form
4 + 5 * 9	81

Python Course Midterm Exam

135. Euler is training hard for a running race, and wants to go as far as possible but must return to the starting point within M (1≤M≤10,000,000) seconds.

The running course is divided into a total of T (1≤T≤100,000) terrains, each represented by a hill, flat road, or downhill. The distance of each terrain ‘i’ is the same.

For the input, in S_i representing the terrain 'i', uphill paths are denoted by 'u', flat paths by 'f', and downhill paths by 'd'.

When running uphill, Euler takes U (1≤U≤100) seconds.
While on a flat road, Euler takes F (1≤F≤100) seconds.
On a downhill, Euler takes D (1≤D≤100) seconds.
Euler must return to the starting point, and when returning to the starting point, uphill paths become downhill paths, and downhill paths become uphill paths.

Input Form:
On the first line, five integers M, T, U, F, D are given.
From the second line, S_i representing each i-th terrain is given on T lines.

Output Form:
Print the farthest distance (number of terrains) that can be covered within M seconds.

Input Form	Output Form
13 5 3 2 1 u f u d f	3

Python Course Midterm Exam

136. Given 10 integers, find the number that appears consecutively the longest and determine the maximum length of consecutive occurrences.

For example, the following sequence of integers is given:

1	3	3	1	1	1	7	7	7	7

In the interval [1, 1], the number 1 appears consecutively 1 time, and in the interval [2, 3], the number 3 appears consecutively 2 times. In the interval [4, 6], the number 1 appears consecutively 3 times, and in the interval [7, 10], the number 7 appears consecutively 4 times.

Input Form:
Ten integers between 1 and 100 (inclusive) are given, separated by a single space.

Output Form:
Print the number that appears consecutively the longest on the first line.
Print the length of consecutive occurrences on the second line.
If there are multiple integers with the same maximum length, choose the one that appears first.

Input Form	Output Form
1 3 3 1 1 1 7 7 7 7	7 4

137. There are N (1≤N≤80) blue and orange beads arranged in a row on the floor. Euler needs to tidy up the long line of beads.

Euler needs to arrange the long line of beads in order, and cannot pick up beads of different colors together.
if the only blue beads are picked up, next the only orange beads must be picked up.
Similarly, if the only orange beads are picked up, then the only blue beads must be picked up.

Euler takes a break to switch colors.

Find the number of breaks he can have.

Input Form:
On the first line, the number of beads N is given.
On the second line, N integers, either 0 or 1, representing the colors of the beads from the front, are given.

Output Form: Print the number of breaks Euler can have.

Input Form	Output Form
6 1 0 0 1 1 1	2

138. The C major scale consists of 8 notes: c d e f g a b C.

For this problem, use unique numbers from 1 to 8 to represent each note.

The composition of the notes can be in ‘ascending’ order from 1 to 8, ‘descending’ order from 8 to 1, or a ‘mixed’ order.

Given 8 notes, determine whether the notes are in ascending, descending, or mixed order.

Input Form:
Eight integers in the range of 1 to 8 are given, separated by a single space.
Each integer appears exactly once in the input.

Output Form:
If the given notes are in ascending order, output 'ascending'.
If they are in descending order, output 'descending'.
If the notes are mixed, output 'mixed'.

Input Form	Output Form
1 2 3 4 5 6 7 8	ascending

Input Form	Output Form
8 7 6 5 4 3 2 1	descending

Input Form	Output Form
8 1 7 2 6 3 5 4	mixed

Python Course Midterm Exam

139. On this holiday, Euler plans to purchase gifts for his family, so he visits a famous gift shop at Hogwarts.
To his surprise, he finds that N people are already standing in line.

Fortunately, Euler realizes that some people are standing in line as part of a group, while others are waiting individually. The members of a group are friends who want to purchase items together, and they wait together until their friend completes the purchase. Once their friend buys the item, all members of the group leave the line together.

There are no members of one group standing between members of another group, and each group wears the same color shirts. Also, there are no adjacent groups or individuals wearing the same color shirts.

Given the data of people standing in line, Euler wants to know at which position he will be making his purchase.

Write a program to determine this position.

Input Form:
On the first line, an integer N is given, representing the number of people standing in a line. (1≤N≤25)
From the second line, N lines are provided, each containing a single uppercase English alphabet. This represents the color of the shirt worn by the first person.

Output Form: Print the position at which Euler will make his purchase.

Input Form	Output Form
6 C C P C Z Z	5

Python Course Midterm Exam

140. Every morning, Euler gathers the kingdom's citizens for exercise in the stadium. He asks them to form lines in 2 rows.

Euler has already arranged the stadium in a grid format of 2 x N (1 ≤ N ≤ 100). In other words, the exercise area is represented by a grid of 2N.

After completing all the preparations for the exercise, Euler realizes that some positions have trees growing, and of course, citizens cannot exercise on top of trees. Since this exercise requires people to gather in groups and exercise together, Euler can only use a portion of the stadium.

Therefore, Euler wants to find the maximum number of citizens who can be accommodated in the stadium at once, forming 2 lines.

Find the maximum number of people that can be arranged in two lines at the playground.
Note that the number of people exercising must always be a multiple of 2 x K (K ≤ N) in each row (each column should accommodate exactly 2 people).

Input Form:
On the first line, an integer N is given, representing the length of the playground.
From the second line, two integers are given for each line, N times, representing the state of the playground, where 1 indicates the presence of a tree at that grid position and 0 indicates a flat area.

Output Form: Print the maximum number of people who can exercise at once.

Input Form	Output Form
7 0 0 1 0 1 1 0 0 0 0 0 0 0 1	6