Pythonic Kraken - A Problem-Solving Journey

Another set of Problems from IITM-DS

1. Print the first 5 positive integers in ascending order with one number in each line
2. Print the following pattern.

   ```
   *
   **
   ***
   ****
   *****
   ```

   There are no spaces between consecutive stars. There are no spaces at the end of each line.
3. Accept an integer as input and print its square as output.
4. Accept two integers as input and print their sum as output.
5. Accept two words as input and print the two words after adding a space between them.
6. Accept the registration number of a vehicle as input and print its state-code as output.
7. Accept a five-digit number as input and print the sum of its digits as output.item
8. Accept five words as input and print the sentence formed by these words after adding a space between consecutive words and a full stop at the end.
9. Accept the date in DD-MM-YYYY format as input and print the year as output.
10. Accept a sequence of five single digit numbers separated by commas as input. Print the product of all five numbers
11. Assume that several IITs start offering online degrees across multiple branches. The email-id of a student is defined as follows: `branch_degree_year_roll@student.onlinedegree.institute.ac.in` For example, if the email-id is `CS_BT_21_7412@student.onlinedegree.iitm.ac.in`, then this student is from the computer science branch, pursuing a BTech degree from IITM, starting from the year 2021, with 7412 as the roll number. branch, degree and year are codes of length two, while roll and institute are codes of length four. Accept a student's email-id as input and print the following details, one item on each line: (1) Branch (2) Degree (3) Year (4) Roll number (5) Institute
12. Accept two positive integers x and y as input. Print the number of digits in x^y
13. Accept two positive integers$M$ and N as input. There are two cases to consider:
    (a) If $M < N$, then print M as output.
    (b) If $M >= N$, subtract N from M. Call the difference $M1$. If $M1 >= N$, then subtract N from $M1$ and call the difference $M2$. Keep doing this operation until you reach a value k, such that, $M_k < N$. You have to print the value of M_k as output.
14. Accept a non-zero integer as input. Print positive if it is greater than zero and *negative* if it is

less than zero.

15. Consider the piece-wise function given below:

$$f(x) = \begin{cases} x + 2, & 0 < \text{x} < 10 \\ x^2 + 2 & 10 \leq \text{x} \\ 0 & \text{otherwise} \end{cases}$$

Accept the value of x as input and print the value of $f(x)$ as output. Note that both the input and output are real numbers. Your code should reflect this aspect. That is, both$x$ and $f(x)$ should be float values.

16. Accept an integer and print the time of the day. Use the following table for reference. The input will be a a single line containing an integer. The output should be containing one of these strings given under the column **Output**

Input	Output
$T < 0$	INVALID
$0 \leq T \leq 5$	NIGHT
$6 \leq T \leq 11$	MORNING
$12 \leq T \leq 17$	AFTERNOON
$18 \leq T \leq 23$	INVALID
$T > 23$	INVALID

17. Accept a point in 2D space as input and find the region in space that this point belongs to. A point could belong to one of the four quadrants, or it could be on one of the two axes, or it could be the origin. The input is given in 2 lines: the first line is the `x-coordinate` of the point while the second line is its `y-coordinate`. The possible outputs are `first, second, third, fourth, x-axis, y-axis, and origin`. Any other output will not be accepted. Note that all outputs should be in lower case.

18. Write a program to realize the equation of a line given 2 points (x_1, y_1) and (x_2, y_2) in 2D space. The input is in 5 lines where, the first, second, third, and fourth lines represent x_1, y_1, x_2, and y_2, respectively. The fifth line corresponds to x_3. Determine y_3 using the equation of a straight line as given below:

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1}$$

The output should be `Vertical Line` if the line is vertical. In other cases, the output should be 2 lined, where the first line is the value of y_3 and the second line indicates whether the slope of the line is positive, negative or zero. Print `Positive Slope`, `Negative Slope` or `Horizontal Line` accordingly.

Note : all inputs must be processed as real numbers.

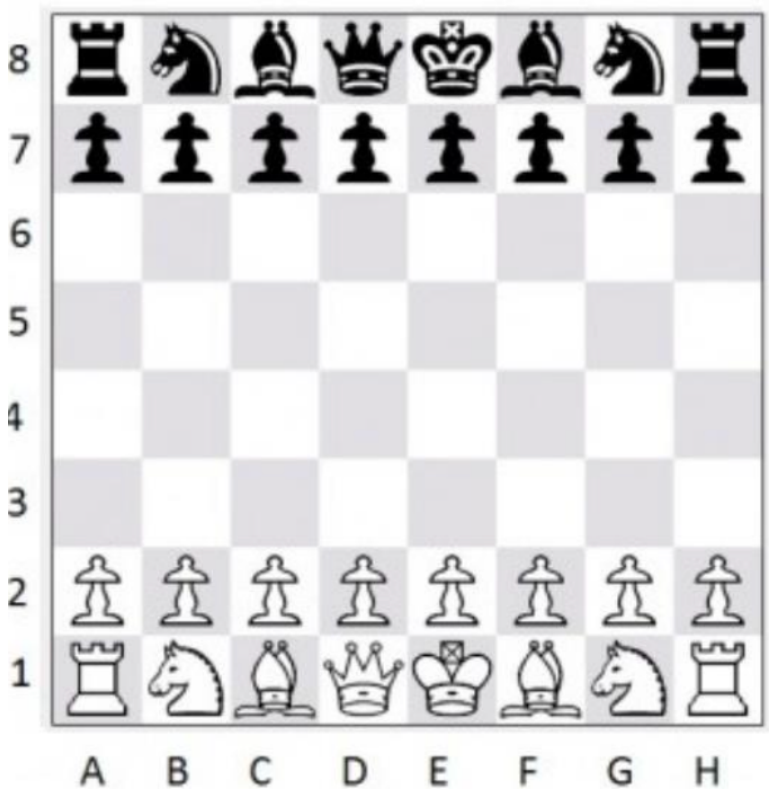
19. Accept a string as input. If the input string is of odd length, then continue with it. If the input string is of even length, make the string of odd length as below:

    - If the last character is a period (.), then remove it
    - If the last character is not a period, then add a period (.) to the end of the string

    Call this string of odd length a word. Select a substring made up of three consecutive characters from word such that there are an equal number of characters to the left and right of this substring. Print this substring as output. You can assume that all input strings will be in lower case and will have a length of at least four.

20. A sequence of five words is called `magical` if thei^{th} word is a substring of the $(i+1)^{th}$ word for every$i$ in range $1 \leq i < 5$. Accept a sequence of five words as input, one word on each line. Print magical if the sequence is `magical` and `non-magical` otherwise. Note that str_1 is a substring of str_2 if and only if str_1 is present as a sequence of consecutive characters in str_2.

21. Consider the following image of a chessboard:



Accept two positions as input: `start` and `end`. Print `YES` if a bishop at `start` can move to `end` in exactly one move. Print `NO` otherwise. Note that a bishop can only move along diagonals.

22. You have `n` gold coins with you. You wish to divide this among three of your friends under the following conditions:

    (a) All three of them should get a non-zero share.

    (b) No two of them should get the same number of coins.

    (c) You should not have any coins with you at the end of this sharing process.

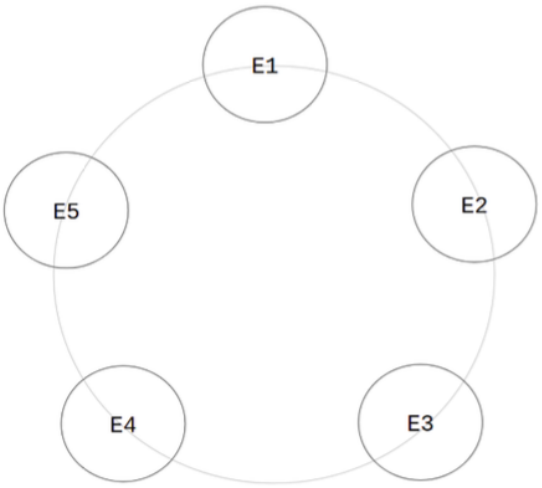
    The input has four lines. The first line contains the number of coins with you. The next three lines will have the share given to your three friends. All inputs shall be non-negative integers. If the division satisfies these conditions, then print the string `FAIR`. If not, print `UNFAIR`.

23. Accept a real number x as input and print the greatest integer less than or equal to x on the

first line, followed by the smallest integer greater than or equal to x on the second line.

24. Accept three positive integers as input and check if they form the sides of a right triangle. Print YES if they form one, and NO is they do not. The input will have three lines, with one integer on each line. The output should be a single line containing one of these two strings: `YES` or `NO`.

25. ***EvenOdd*** is a tech startup. Each employee at the startup is given an employee id which is a unique positive integer. On one warm Sunday evening, five employees of the company come together for a meeting and sit at a circular table:



The employees follow a strange convention. They will continue the meeting only if the following condition is satisfied.

The sum of the employee-ids of every pair of adjacent employees at the table must be an even number.

They are so lazy that they won't move around to satisfy the above condition, If the current seating plan does not satisfy the condition, the meeting will be canceled. You are given the employee-id of all five employees. Your task is to decide if the meeting happened or not.

The input will be five lined, each containing an integer. The i^{th} line will have the employee-id of five employees The output will be a single line containing one of these two strings: `YES` or `NO`.

26. Accept a string as input and print the vowels present in the string in alphabetical order. If the string did not contain any vowels, then print the string none as output. Each vowel that appears in the input string - irrespective of its case should appear just once in lower case in the output.

27. You are given the date of birth of two persons, not necessarily from the same family. Your task is to find the younger of the two. If both of them share the same date of birth, then the younger of the two is assumed to be that person whose name comes first in alphabetical order. The input will have four lines. The first two lines correspond to the first person, while the last two lines correspond to the second person. For each person, the first line corresponds to the name and the second line corresponds to the date of birth in `DD-MM-YYYY` format. Your output should be the name of the younger of the two.

28. Accept a positive integer n as input and print the first n positive integers, one number on each line.
29. Accept a positive integer n as input and print all the factors of n, one number on each line.
30. Accept two positive integers a and b as input. Print the sum of all integers in the range $[1000, 2000]$, endpoints inclusive, that are divisible by both a and b . If you find no number satisfying this condition in the given range, then `print 0`.
31. Accept a positive integer n as input, where $n > 1$. Print `PRIME` if n is a prime number and `NOT A PRIME` otherwise.
32. Accept a sequence of positive integers as input and print the the maximum number in the sequence. The input will have $n + 1$ lines, where n denotes the number of terms in the sequence. The i_{th} line in the input will contain the i_{th} term in the sequence for $1 \leq i \leq n$. The last line of the input will always be the number 0. Each test case will have at least one term in the sequence.
33. Accept a sequence of words as input and print the the shortest word in the sequence. The input will have $n+1$ lines, where n denotes the number of terms in the sequence. The i_{th} line in the input will contain thei_{th} word in the sequence for $1 \leq i \leq n$. The last line of the input will always be the string `abcdefghijklmnopqrstuvwxyz`. This string is not a part of the sequence. You can assume that each test case corresponds to a non-empty sequence of words. If there are multiple words that have the same minimum length, print the first such occurrence.
34. Accept a positive integer as input and print the sum of the digits in the number.
35. Accept a positive integer n as input and print the first n integers on a line separated by a comma.
36. Accept a positive integer n as input and print the sum of all prime numbers in the range $[1, n]$, endpoints inclusive. If there are no prime numbers in the given range, then `print 0`.
37. Accept a positive integer n as input and find all solutions to the equation:

$$x^2 + y^2 = z^2$$

subject to the following constraints:

(a) x, y and z are positive integers

(b) $x < y < z < n$

Print each solution triplet on one line `- x,y,z -` with a comma between consecutive integers. The triplets should be printed in ascending order. If you do not find any solutions satisfying the given constraints, print the string `NO SOLUTION` as output.

38. Accept two strings as input and form a new string by removing all characters from the second string which are present in the first string. Print this new string as output. You can assume that all input strings will be in lower case.
39. Accept a positive integer n as input and print the sum of the first n terms of the series given below:

$1 + (1 + 2) + (1 + 2 + 3) + (1 + 2 + 3 + 4) + \cdots$. Just to be clear, the first term in the series is 1, the second term is (1 + 2) and so on.

40. Accept a positive integer n, with $n > 1$, as input from the user and print all the prime factors

of n in ascending order.

41. A bot starts at the origin - `(0,0)` - and can make the following moves:

    a) UP b) DOWN c) LEFT d) RIGHT

    Each move has a magnitude of 1 unit. Accept the sequence of moves made by the bot as input. The first entry in the sequence is always $START$ while the last entry in the sequence is always $STOP$. A sample sequence is given below:
    $START \rightarrow UP \rightarrow RIGHT \rightarrow LEFT \rightarrow LEFT \rightarrow DOWN \rightarrow UP \rightarrow STOP$. Print the `Manhattan distance` of the bot from the origin. If the bot is at the position (x, y), then its $Manhattandistance$ from the origin is given by $D = |x| + |y|$

42. Accept a string as input, convert it to lower case, sort the string in alphabetical order, and print the sorted string to the console. You can assume that the string will only contain letters.

43. Accept a phone number as input. A valid phone number should satisfy the following constraints.

    (a) The number should start with one of these digits: 6, 7, 8, 9

    (b) The number should be exactly 10 digits long.

    (c) No digit should appear more than 7 times in the number.

    (d) No digit should appear more than 5 times in a row in the number. If the fourth condition is not very clear, then consider this example: the number `9888888765` is invalid because the digit 8 appears more than 5 times in a row. Print the string `valid` if the phone number is valid. If not, print the string `invalid`.

44. Accept a positive integer n as input and print a `number arrow`of size n. For example, $n = 5$ should produce the following output: 1
    1,2
    1,2,3
    1,2,3,4
    1,2,3,4,5
    1,2,3,4
    1,2,3
    1,2
    1
    You can assume that n is greater than or equal to 2 for all test cases.
    Hint: *range(5, 0, -1)* is the sequence $5, 4, 3, 2, 1$

45. Accept a sequence of words as input, append all these words to a list in the order in which they are entered, and print this **list** as output. The first line in the input is a positive integer n that denotes the number of words in the sequence. The next n lines will have one word on each line.

46. Accept a sequence of comma-separated integers as input and print the maximum value in the sequence as output.
    Hint: When in doubt, always print the variables and examine the output.

```
num = '1,2,3,4,5'
L = num.split(',')
```

47. Accept a space-separated sequence of positive real numbers as input. Convert each element of the sequence into the greatest integer less than or equal to it. Print this sequence of integers as output, with a comma between consecutive integers.