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BRANCH/SECTION: AIML/'C'
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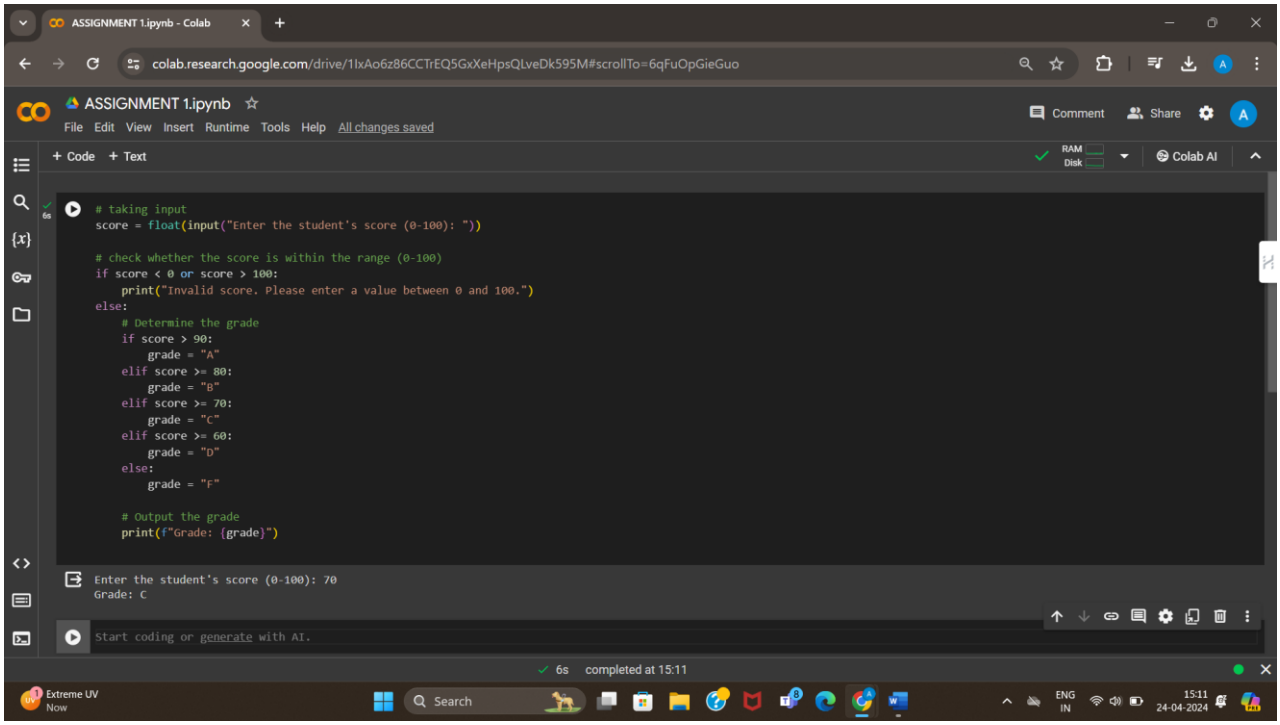
1. Create a Python script that takes a student's score (0-100) as input and prints their grade based on the following criteria:

   Above 90: "Grade: A"
   80 to 90: "Grade: B"
   70 to 79: "Grade: C"
   60 to 69: "Grade: D"
   Below 60: "Grade: F"

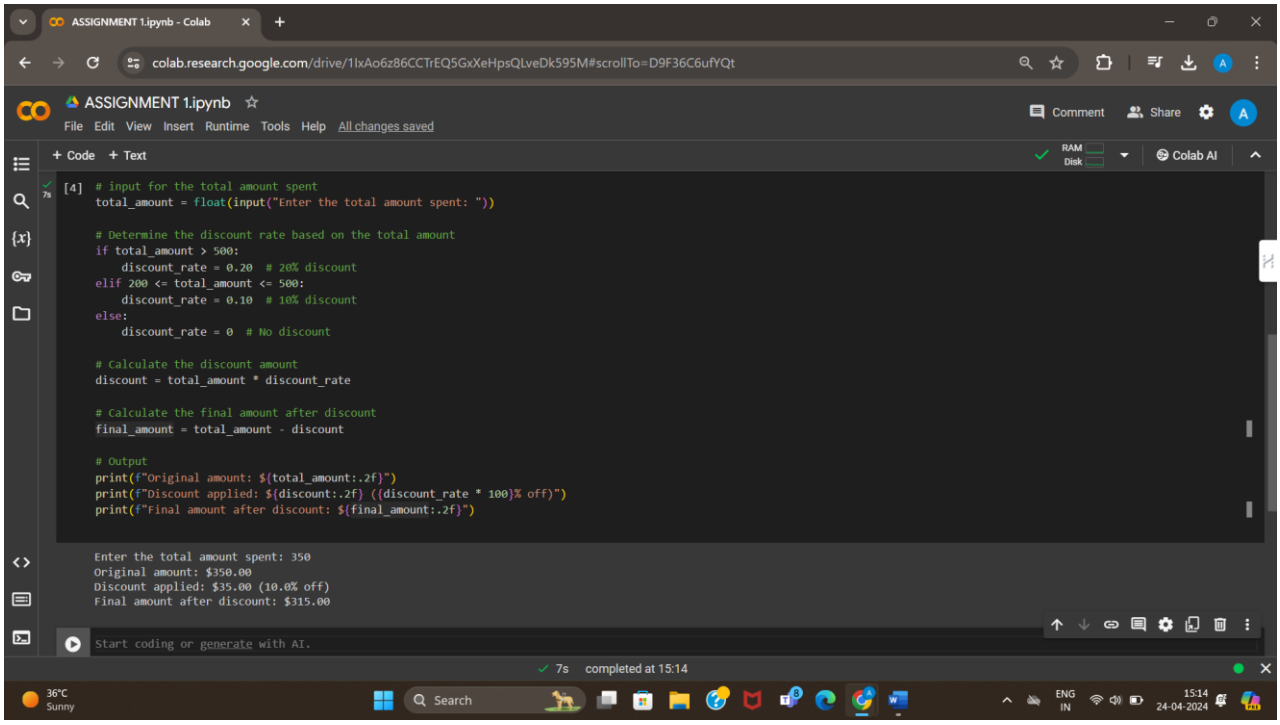
OUTPUT:



2. Create a Python program that applies a discount to a purchase based on the amount spent. The program asks for the total amount and applies the following discount rates:

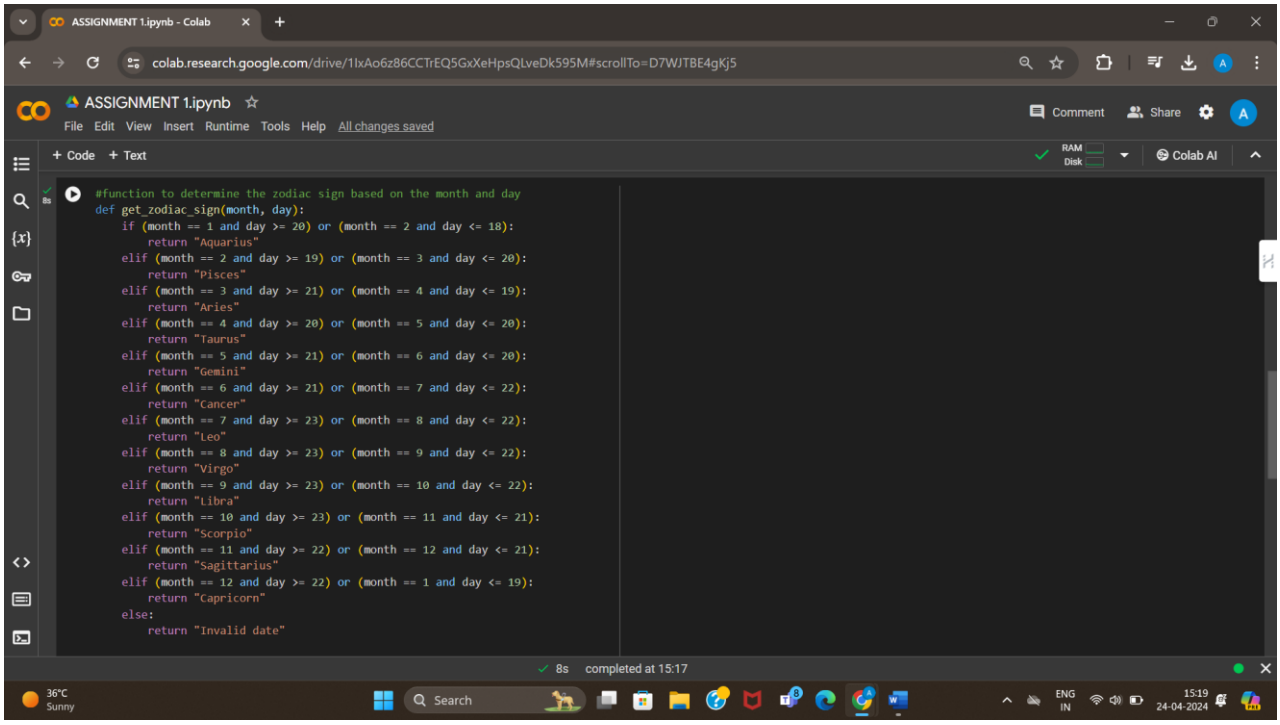
   Spend over $500: 20% discount
   Spend $200 - $500: 10% discount
   Spend below $200: No discount
   The program should print the original amount, the discount applied, and the final amount after the discount.

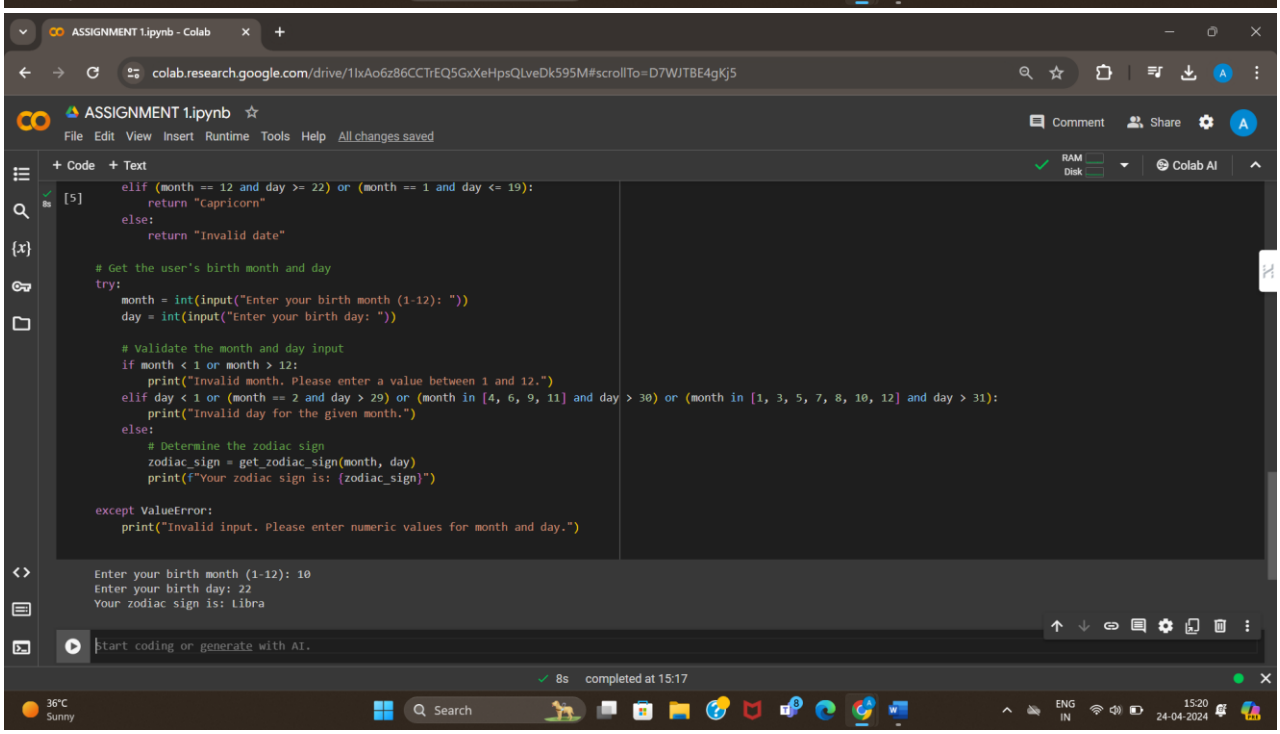
OUTPUT:



3. Create a program that asks for the user's birth month and day and then tells them their zodiac sign. For simplicity, you can use the following date ranges:
   Aries: March 21 - April 19
   Taurus: April 20 - May 20
   Gemini: May 21 - June 20
   Cancer: June 21 - July 22
   Leo: July 23 - August 22
   Virgo: August 23 - September 22
   Libra: September 23 - October 22
   Scorpio: October 23 - November 21
   Sagittarius: November 22 - December 21
   Capricorn: December 22 - January 19
   Aquarius: January 20 - February 18
   Pisces: February 19 - March 20
   Make sure to handle invalid inputs gracefully.

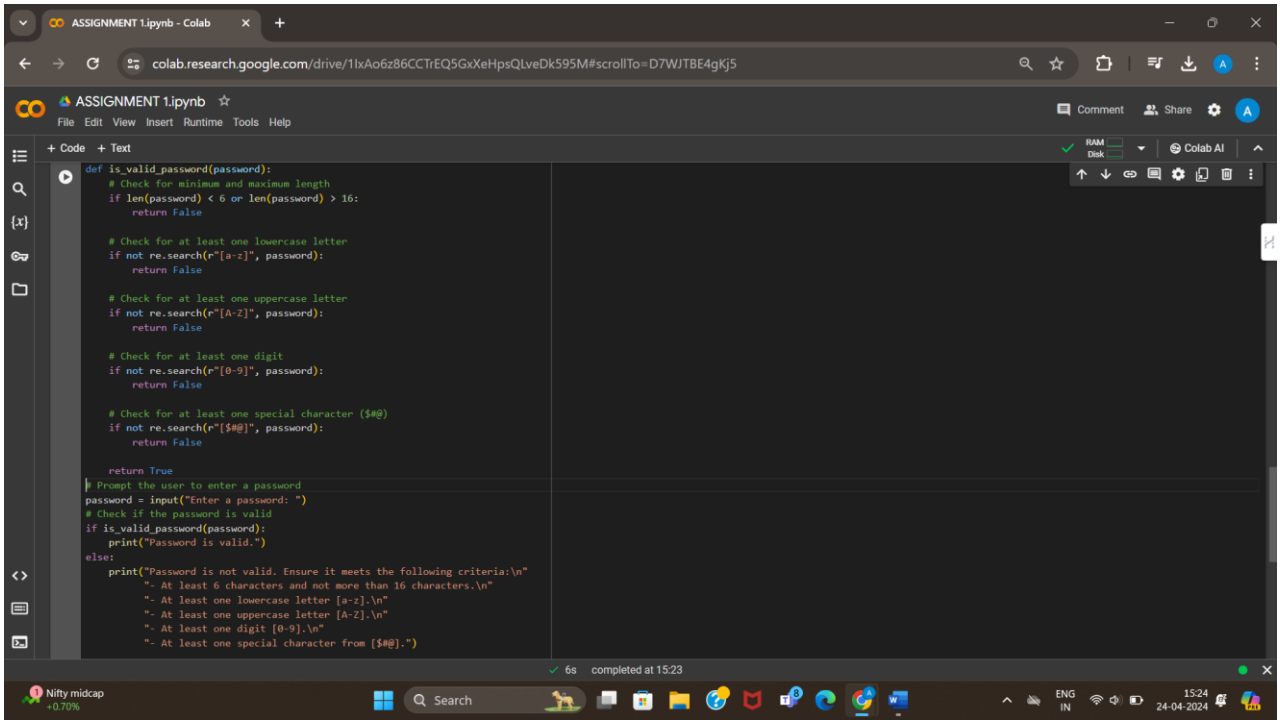
OUTPUT:





4. Write a Python program to check the validity of a password entered by the user. The password is considered valid if it meets the following criteria:
   At least 1 letter between [a-z] and 1 letter between [A-Z].
   At least 1 number between [0-9].
   At least 1 character from [$#@].
   Minimum length of 6 characters.
   Maximum length of 16 characters.
   The program should print whether the password is valid or not based on these criteria.

OUTPUT:

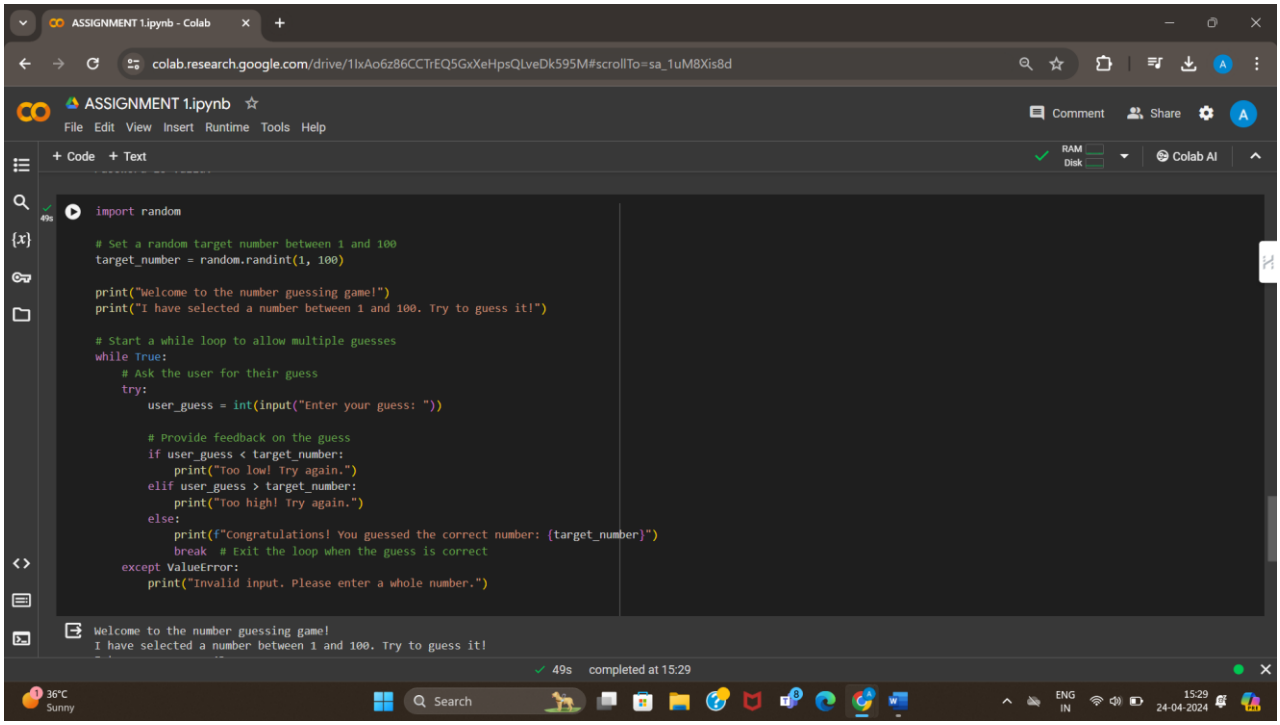


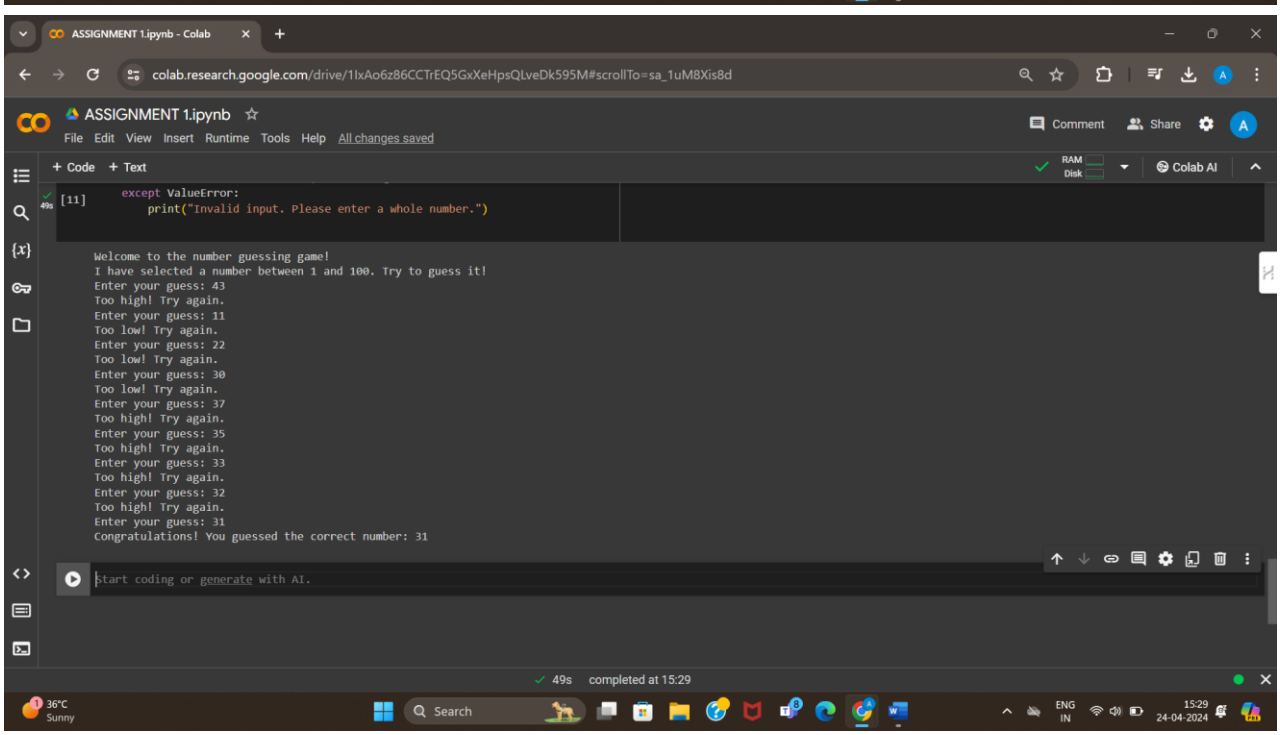

```
Enter a password: av1122
Password is not valid. Ensure it meets the following criteria:
- At least 6 characters and not more than 16 characters.
- At least one lowercase letter [a-z].
- At least one uppercase letter [A-Z].
- At least one digit [0-9].
- At least one special character from [$#@].
```

```
Enter a password: Av@1012
Password is valid.
```

5. Implement a simple number guessing game. First, set a target number within a certain range (e.g., 1 to 100). Then, using a while loop, ask the user to guess the number. Provide feedback for each guess ("too high" or "too low"). The game ends when the user guesses the number correctly. Use a break statement to exit the loop once the correct number is guessed.

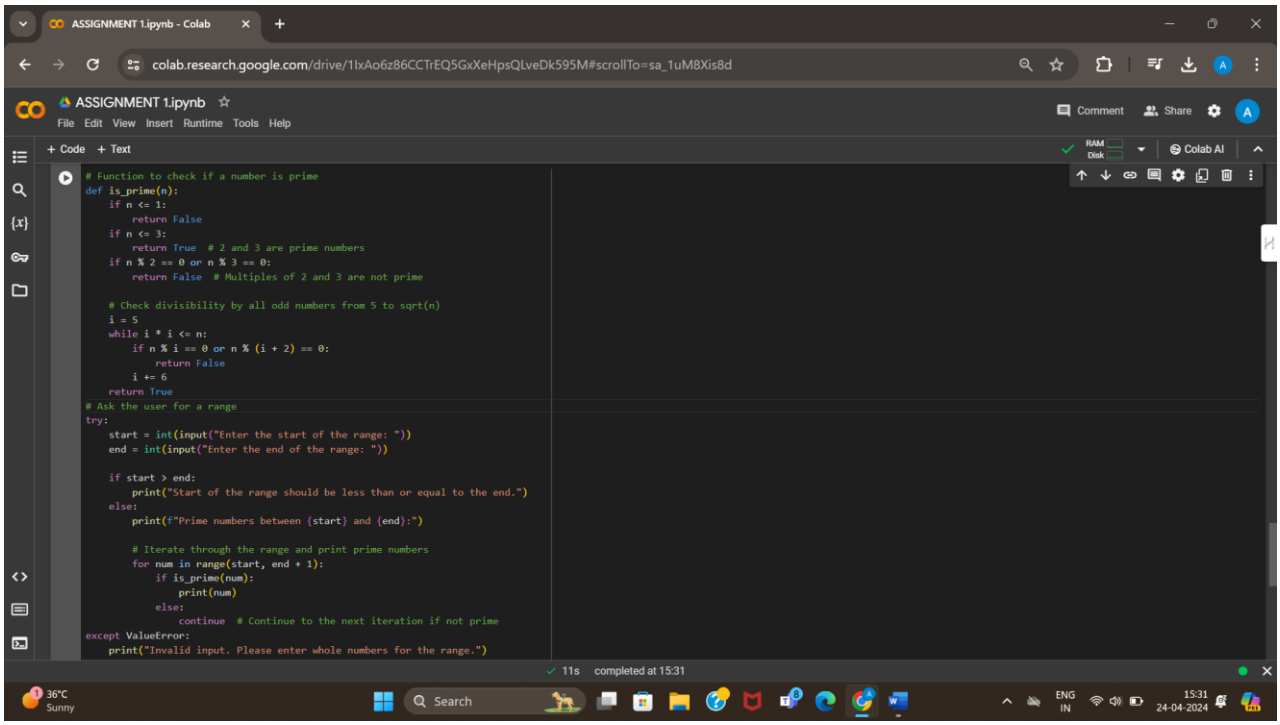
OUTPUT:

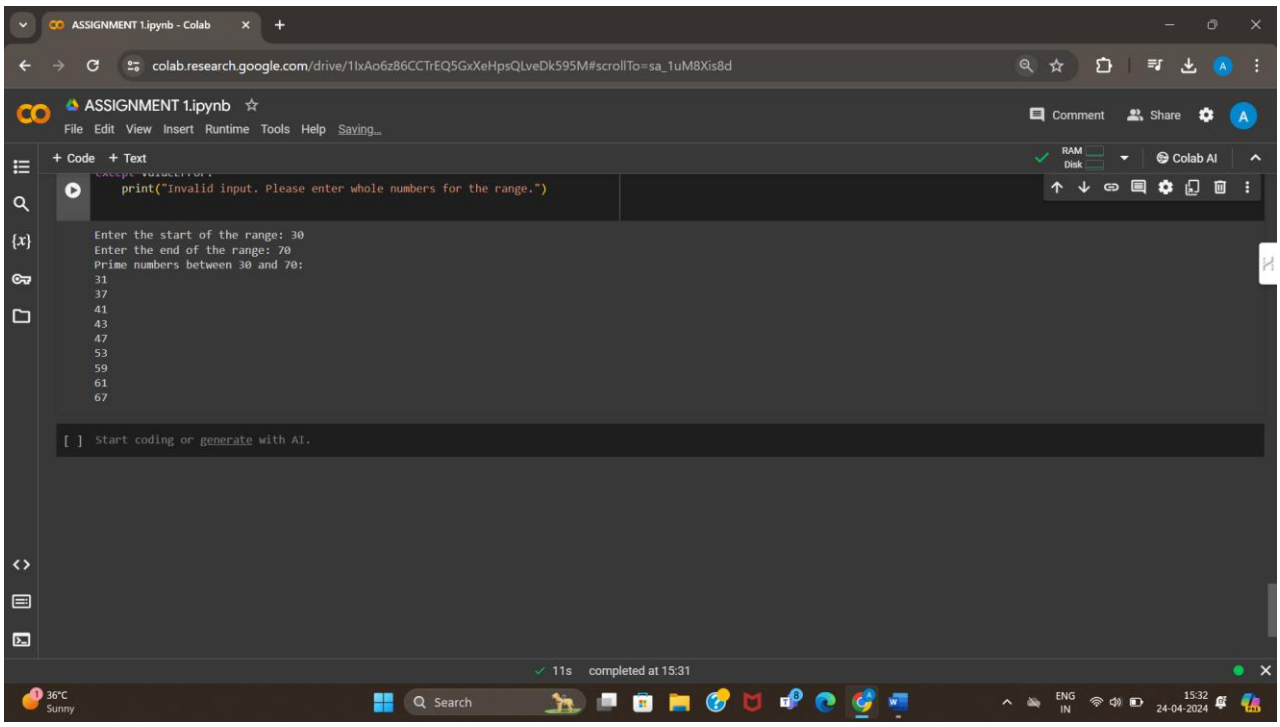




6. Write a Python program that asks the user to enter a range (start and end numbers). Use a for loop to iterate through this range, and for each number, check if it is a prime number. If it is, print the number. Use the **continue** statement to skip non-prime numbers efficiently.

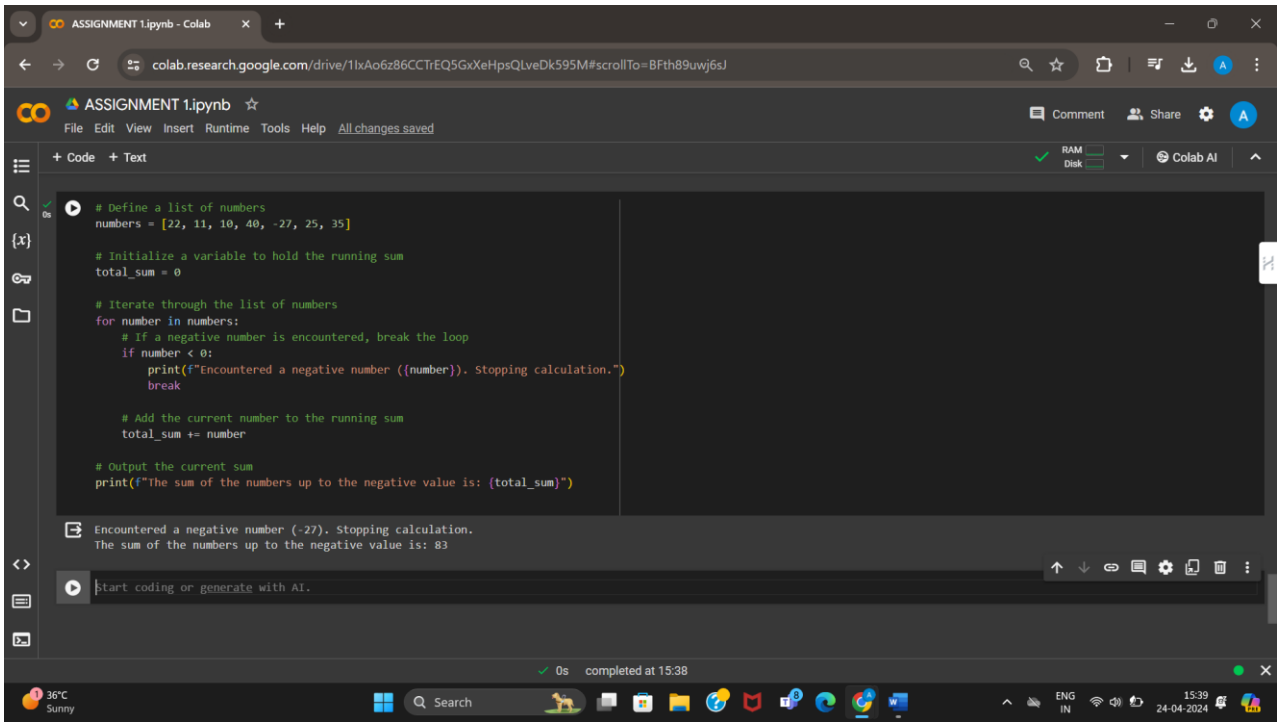
OUTPUT:





7. Create a Python program that iterates through a list of numbers (you can define the list in the code) and calculates the sum of the numbers. However, if the program encounters a number that is negative, it should stop adding any further numbers (i.e., break out of the loop) and print the current sum up to that point.

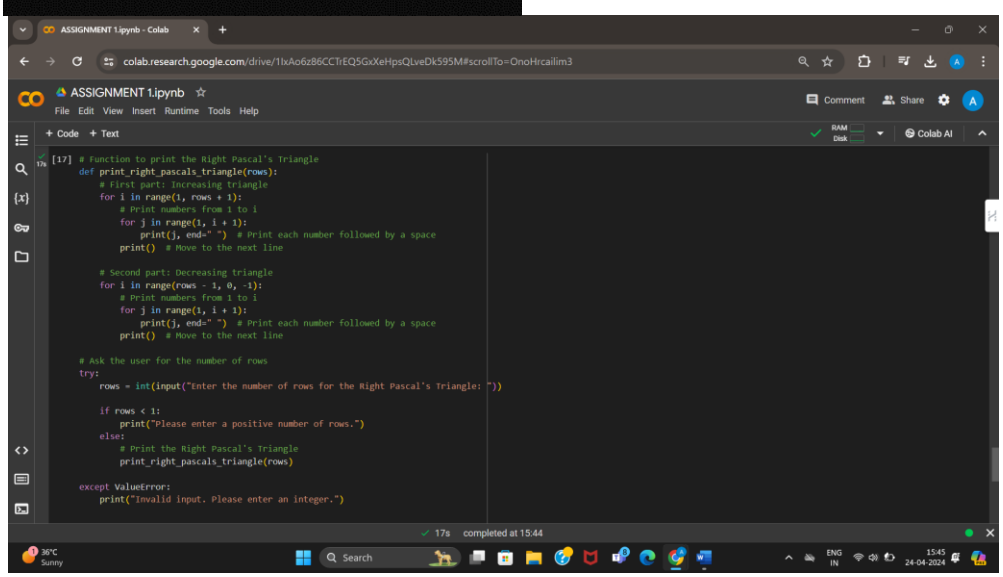
OUTPUT:



8. Write a Python program to print the following patterns

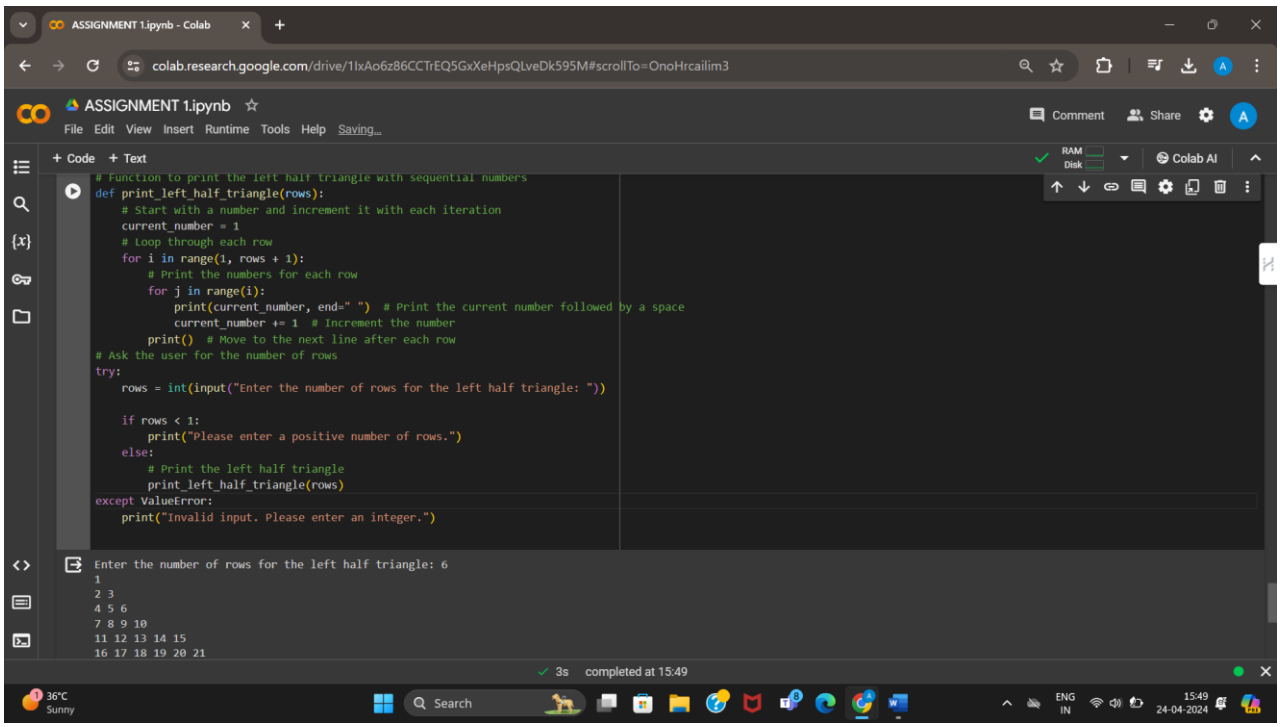
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

CODE:



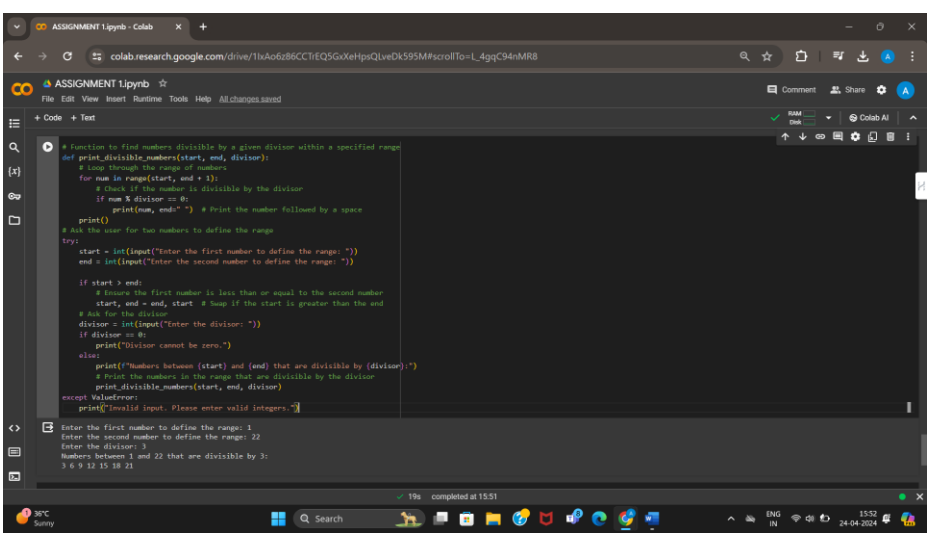
```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
16 17 18 19 20 21
```

CODE:



9. Create a program that asks for two numbers and prints all the numbers between them that are divisible by a third number asked from the user.

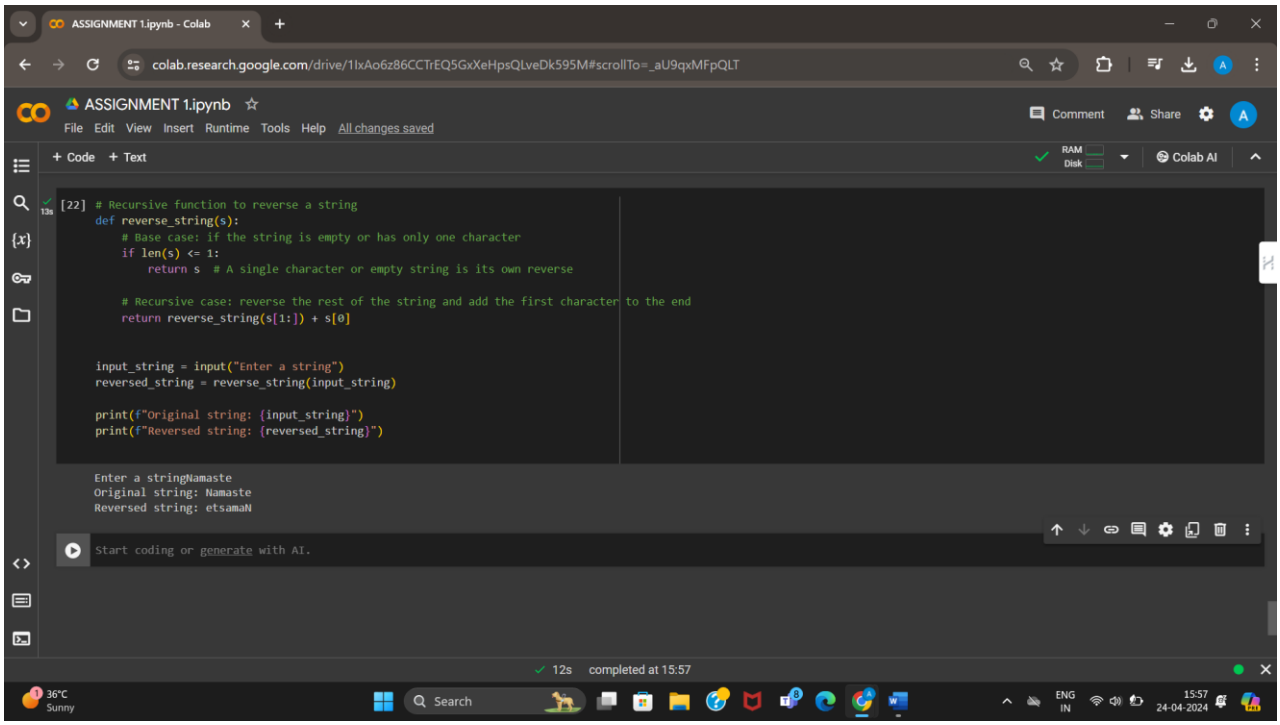
OUTPUT:



10. Write a recursive function named reverse_string that takes a string as input and returns its reverse. The function must use recursion to accomplish this task and should not use any loops or slicing ([::-1]).

    Example Usage:
    print(reverse_string("hello"))
    Expected Output:
    "olleh"

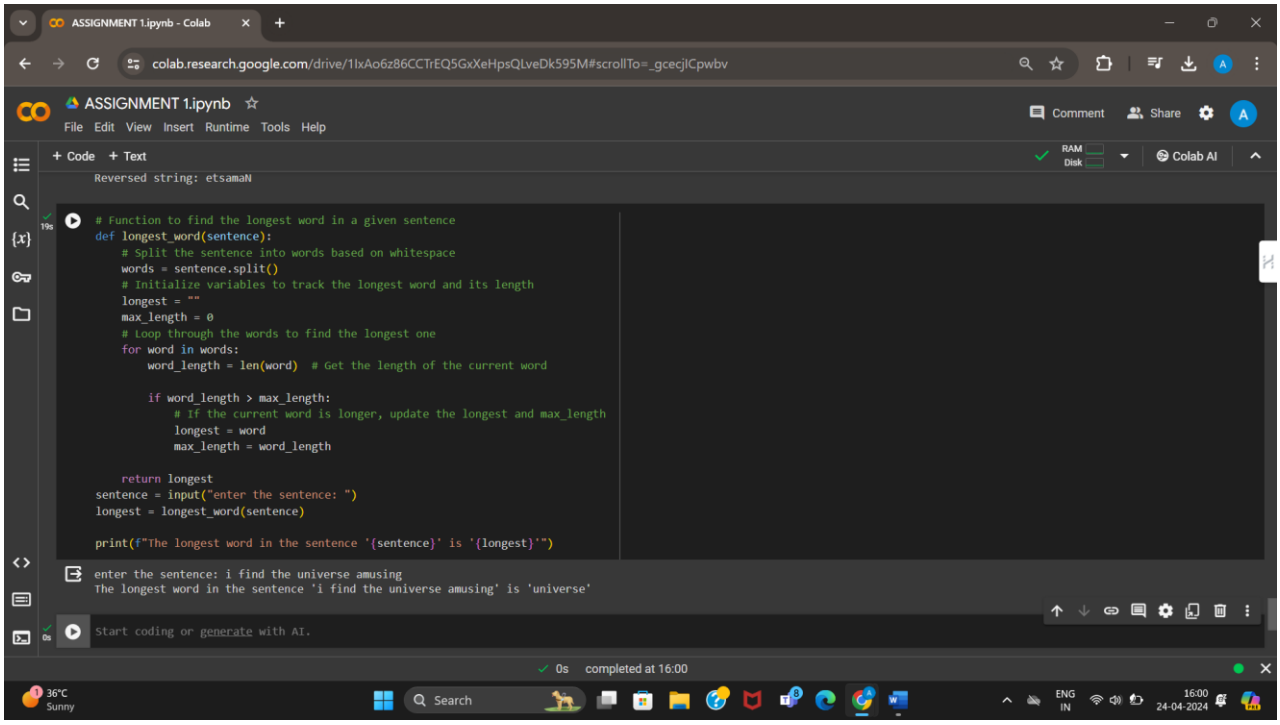
OUTPUT:



11. Create a function longest_word(sentence) that finds and returns the longest word in the given string sentence. If there are multiple words of the same length, return the first one encountered.

    # Example: longest_word("I love programming") should return "programming"

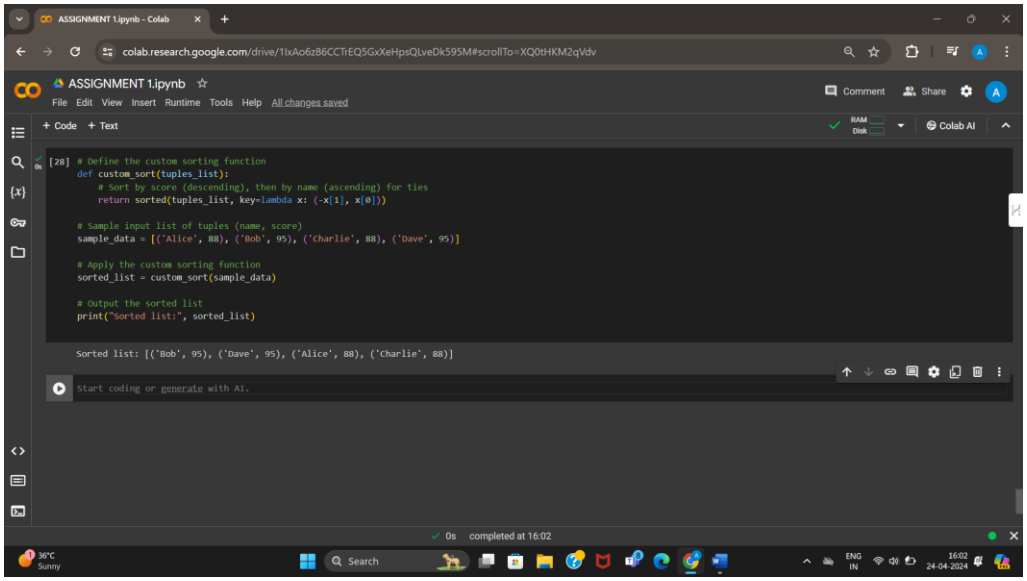
OUTPUT:



12. Create a Python function named custom_sort that takes a list of tuples where each tuple contains a name and a score. The function should return a new list sorted by scores in descending order. If two tuples have the same score, they should be sorted alphabetically by name in ascending order. Test your function with a predefined list of tuples and print the sorted list.

    Sample Input: [('Alice', 88), ('Bob', 95), ('Charlie', 88), ('Dave', 95)]
    Sample Output: [('Bob', 95), ('Dave', 95), ('Alice', 88), ('Charlie', 88)]

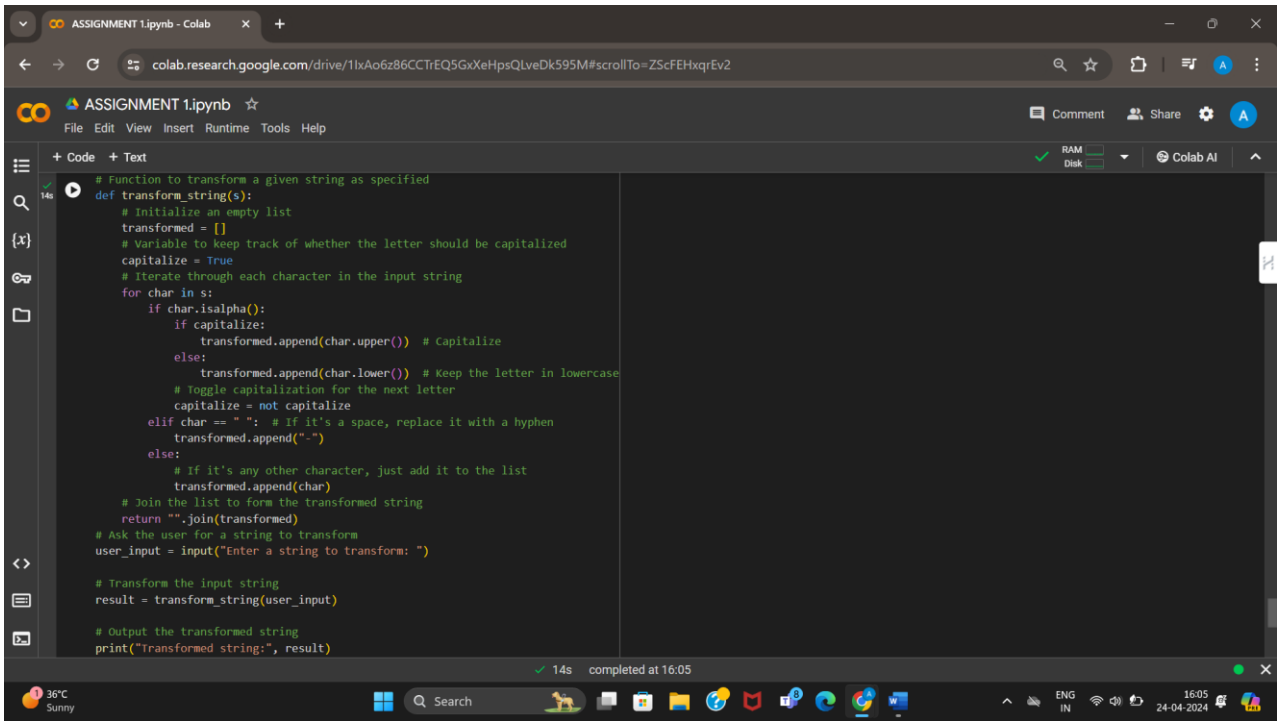
OUTPUT:

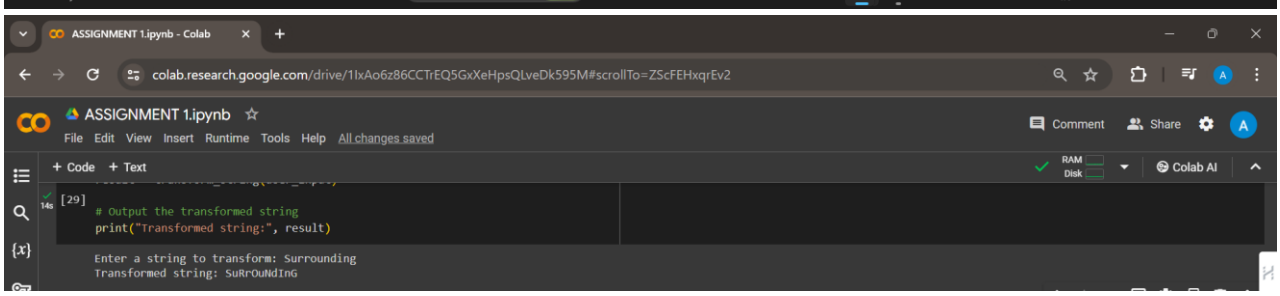


13. Develop a Python function named transform_string that takes a string and performs the following transformations: it capitalizes every other letter starting with the first character (ignoring non-letter characters for the alternation pattern), and it replaces spaces with hyphens (-). For example, hello world becomes HeLlO-WoRlD. After defining the function, ask the user for a string and print its transformation.

    Sample Input: hello world
    Sample Output: HeLlO-WoRlD

OUTPUT:



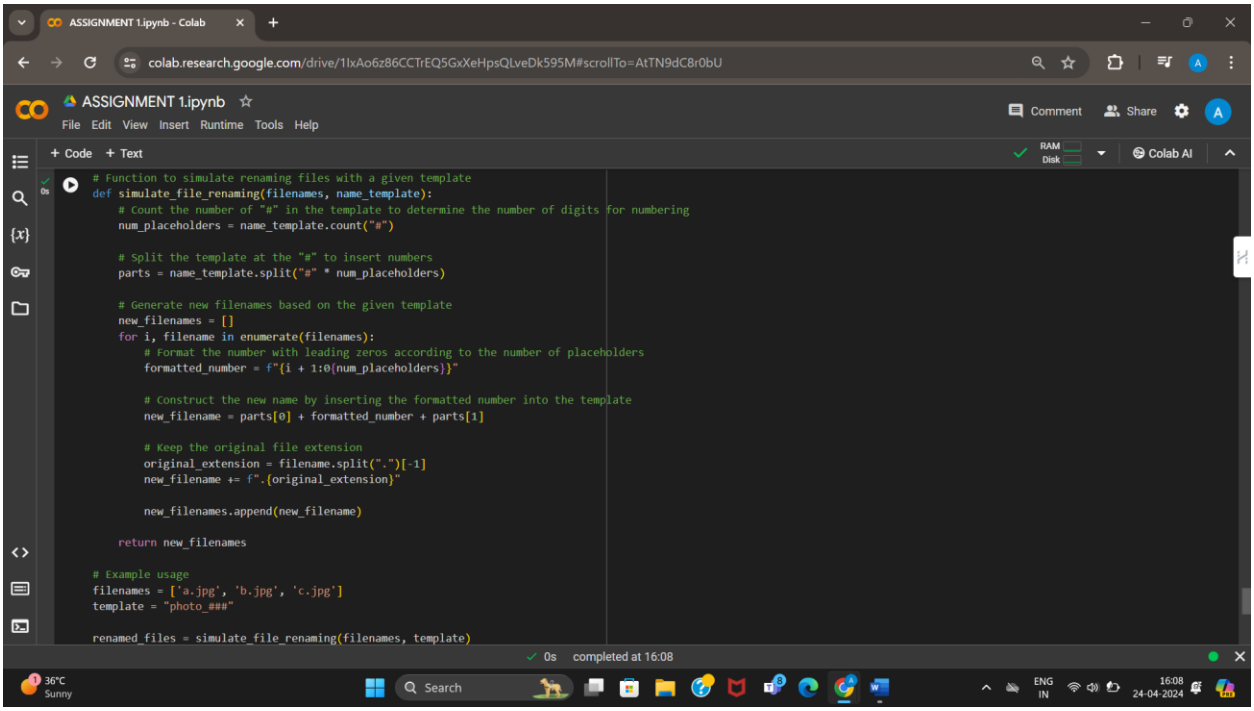


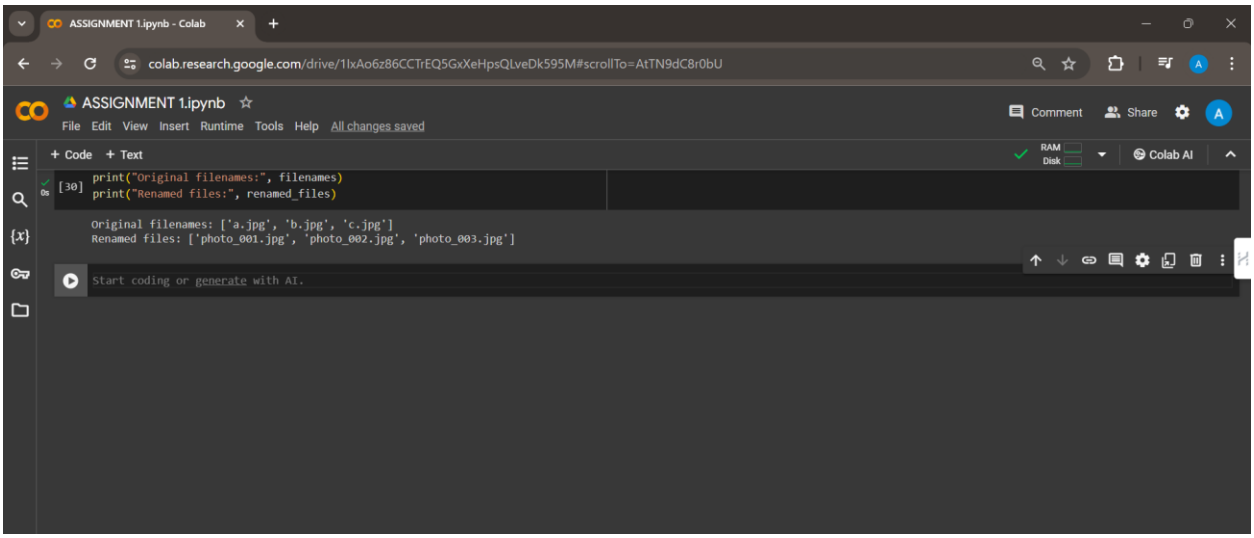
14. Create a function named simulate_file_renaming that takes two parameters: a list of filenames (as strings) and a new name template (a string containing a placeholder for a number, e.g., image_##). The function should return a list of strings representing the new filenames where the placeholder is replaced by an incremental number, starting from 1 and formatted to have leading zeros if necessary, according to the placeholder's length. For instance, renaming ['a.jpg', 'b.jpg', 'c.jpg'] with the template photo_### would

result in ['photo_001.jpg', 'photo_002.jpg', 'photo_003.jpg']. This exercise simulates the renaming process, so you should only return the renamed list without actually renamingany files.

Sample Input: ['a.jpg', 'b.jpg', 'c.jpg'], photo_###
Sample Output: ['photo_001.jpg', 'photo_002.jpg', 'photo_003.jpg']

OUTPUT:





15. You are given a list of words. Write a Python function called group_anagrams that groups allanagrams together and returns them as a list of lists.

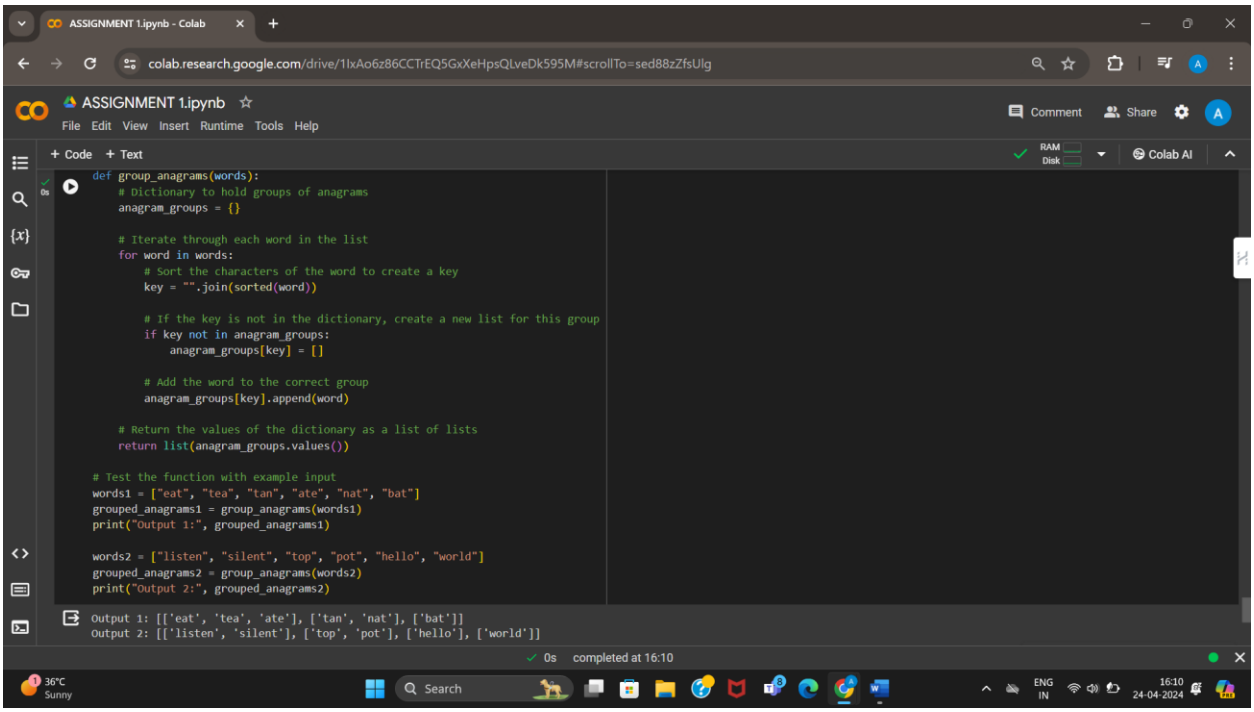
    Two words are considered anagrams if they contain the same characters but in a different order.

Examples:

Input: ["eat", "tea", "tan", "ate", "nat", "bat"]
Output: [["eat", "tea", "ate"], ["tan", "nat"], ["bat"]]

Input: ["listen", "silent", "top", "pot", "hello", "world"]
Output: [["listen", "silent"], ["top", "pot"], ["hello"], ["world"]]

OUTPUT:



16. You are given a list of integers. Write a Python function called max_subarray_sum to find thecontiguous subarray within the list that has the largest sum and return that sum.

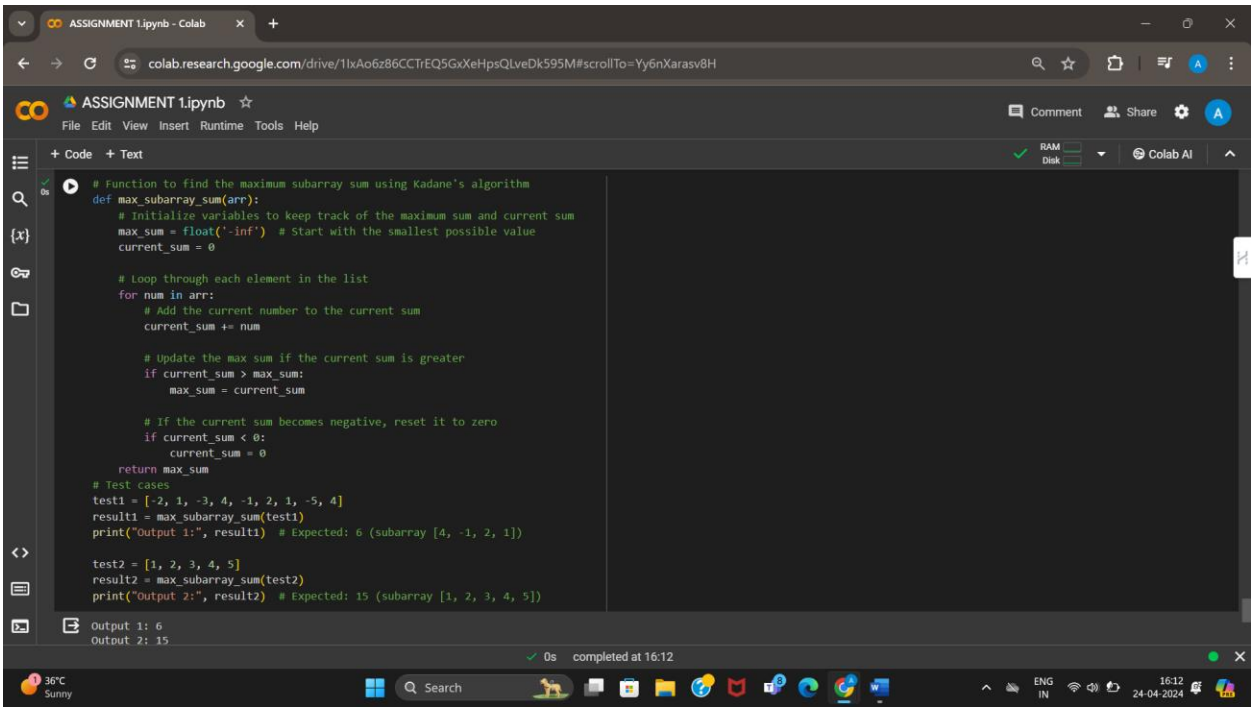
    For example, given the list [−2, 1, −3, 4, −1, 2, 1, −5, 4], the contiguous subarray with the largest sum is [4, −1, 2, 1], and the maximum sum is 6.

Examples:

Input: [-2, 1, -3, 4, -1, 2, 1, -5, 4]
Output: 6 (corresponding to the subarray [4, -1, 2, 1])

Input: [1, 2, 3, 4, 5]
Output: 15 (corresponding to the subarray [1, 2, 3, 4, 5])

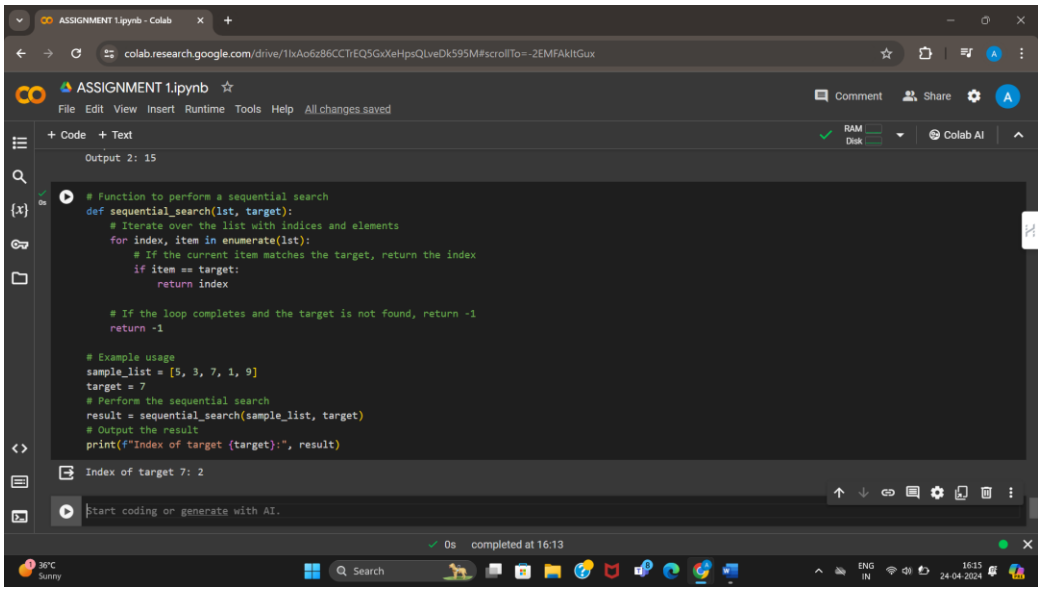
OUTPUT:



17. Implement a function that performs a sequential search through a list for a specified target value.The function should return the index of the target if found, and -1 if the target is not in the list.

    Sample Input: ([5, 3, 7, 1, 9], 7)
    Sample Output: 2

OUTPUT:



18. Design a method to encode a list of strings to a single string and another method to decode itback to a list of strings.

The encoded string should be concise and easily decodable. Assume there are no character restrictions for individual strings.

Examples:

19. Input: ["hello", "world"]

    Encoded Output: "5#hello5#world" (or another unique format of your choice)
    Decoded Output: ["hello", "world"]

20. Input: ["abc", "def", "ghi"]

    Encoded Output: "3#abc3#def3#ghi"
    Decoded Output: ["abc", "def", "ghi"]

OUTPUT: