LAB 2.2

Name: K.Yashwanth

HallTicket : 2303A51195

Date: 13-Jan-2026

Task 1: Cleaning Sensor Data

❖ Scenario:

❖ You are cleaning IoT sensor data where negative values are invalid.

❖ Task:

Use Gemini in Colab to generate a function that filters out all negative

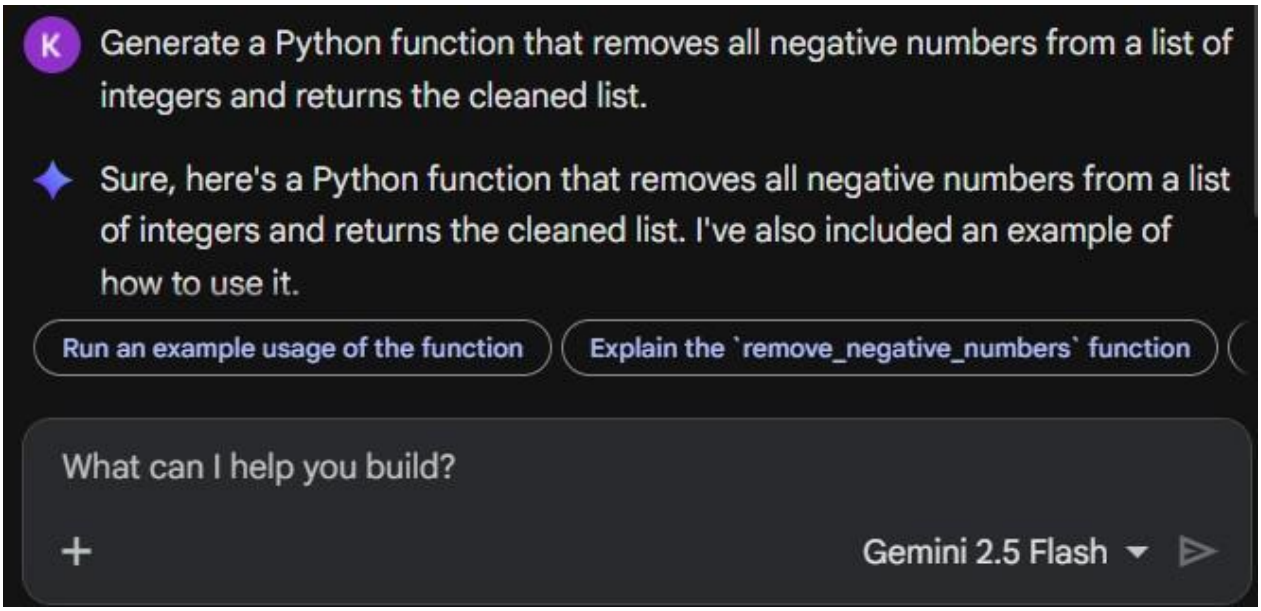
numbers from a list.

❖ Expected Output:

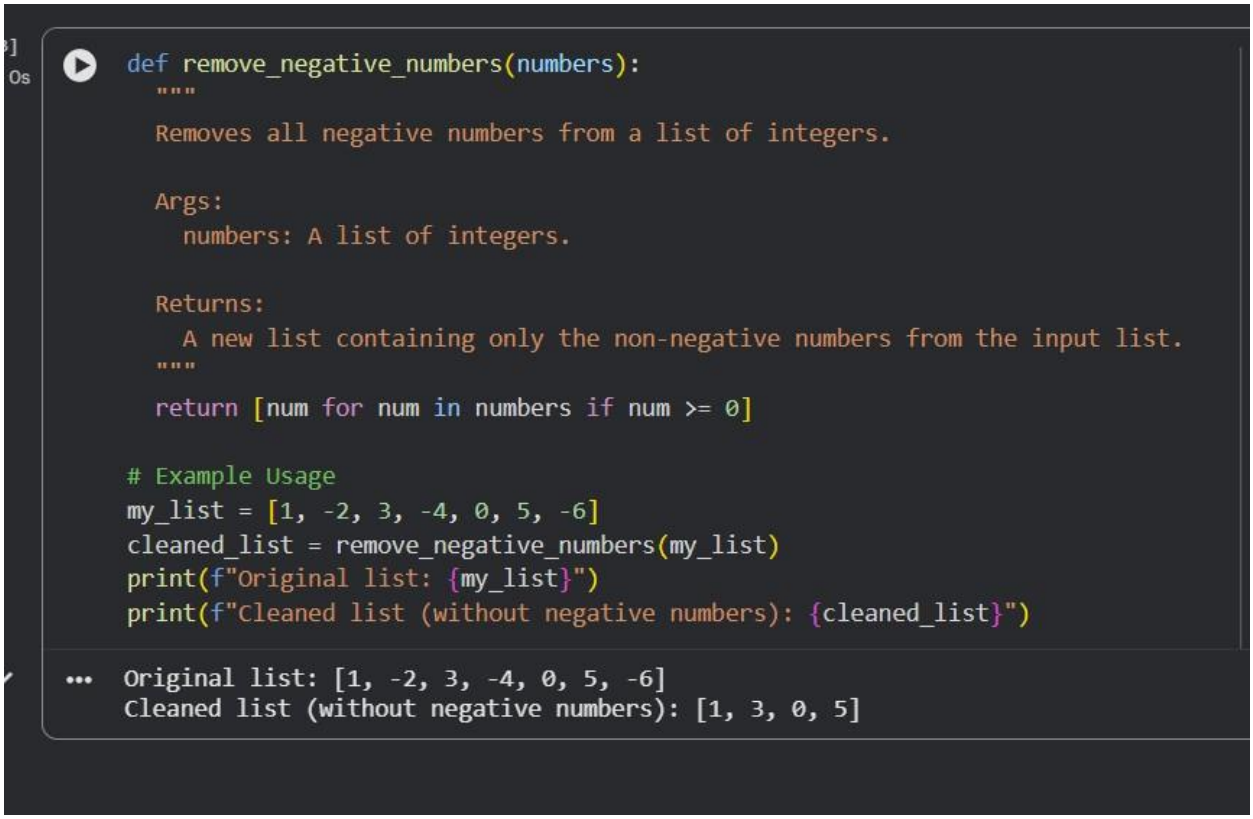
➢ Before/after list

➢ Screenshot of Colab execution

PROMPT:



CODE:



```
def remove_negative_numbers(numbers):
  """
  Removes all negative numbers from a list of integers.

  Args:
    numbers: A list of integers.

  Returns:
    A new list containing only the non-negative numbers from the input list.
  """
  return [num for num in numbers if num >= 0]

# Example Usage
my_list = [1, -2, 3, -4, 0, 5, -6]
cleaned_list = remove_negative_numbers(my_list)
print(f"Original list: {my_list}")
print(f"Cleaned list (without negative numbers): {cleaned_list}")
```

```
Original list: [1, -2, 3, -4, 0, 5, -6]
Cleaned list (without negative numbers): [1, 3, 0, 5]
```

OUTPUT:

Original list: [1, -2, 3, -4, 0, 5, -6]

Cleaned list (without negative numbers): [1, 3, 0, 5]

Task 2: String Character Analysis

❖ Scenario:

You are building a text-analysis feature.

❖ Task:

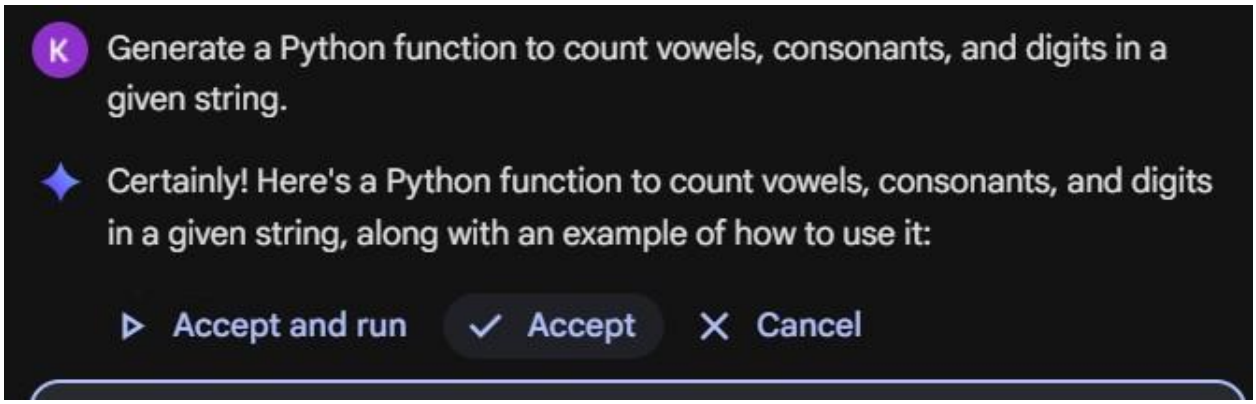
Use Gemini to generate a Python function that counts vowels, consonants, and digits in a string.

❖ Expected Output:

➢ Working function

➢ Sample inputs and outputs

PROMPT:



CODE:

```
def count_char_types(input_string):
  vowels = "aeiouAEIOU"
  digits = "0123456789"
  vowel_count = 0
  consonant_count = 0
  digit_count = 0

  for char in input_string:
    if char.isalpha(): # Check if the character is an alphabet
      if char in vowels:
        vowel_count += 1
      else:
        consonant_count += 1
    elif char.isdigit(): # Check if the character is a digit
      digit_count += 1

  return {"vowels": vowel_count, "consonants": consonant_count, "digits":
  digit_count}

my_string = "Hello World 123!"
counts = count_char_types(my_string)
print(f"Original string: '{my_string}'")
print(f"Vowel count: {counts['vowels']}")
print(f"Consonant count: {counts['consonants']}")
print(f"Digit count: {counts['digits']}")
```

OUTPUT:

Original string: 'Hello World 123!'

Vowel count: 3

Consonant count: 7

Digit count: 3

Task 3: Palindrome Check – Tool Comparison

❖ Scenario:

You must decide which AI tool is clearer for string logic.

❖ Task:

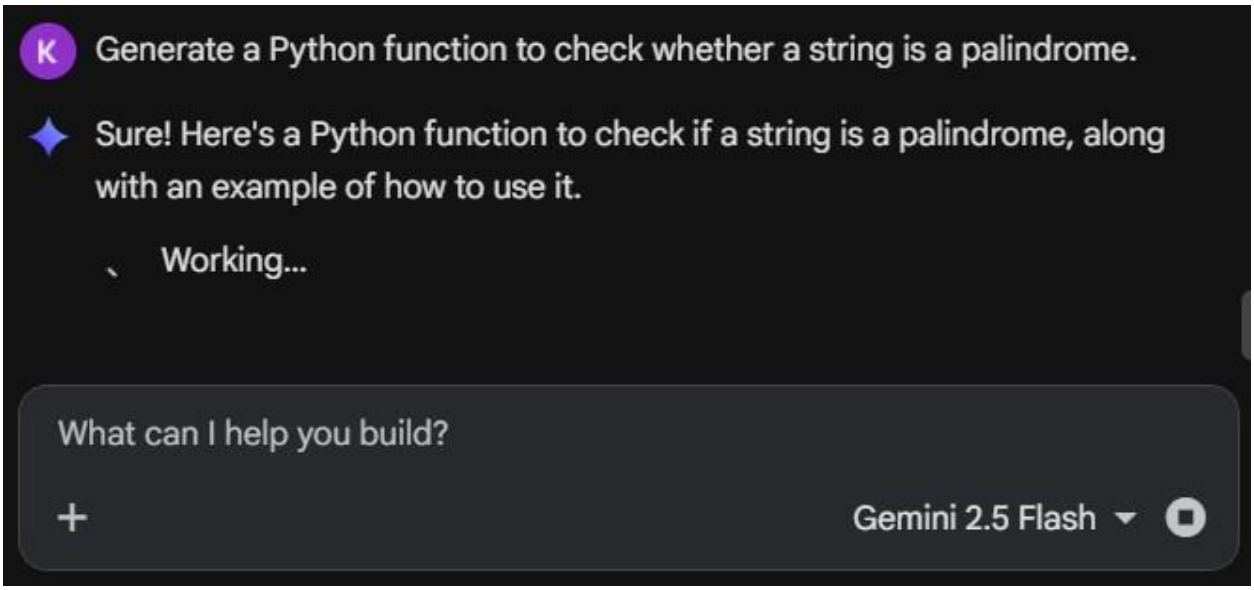
Generate a palindrome-checking function using Gemini and Copilot, then compare the results.

❖ Expected Output:

➢ Side-by-side code comparison

➢ Observations on clarity and structure

PROMPT:



CODE: GEMINI GENERATED

```
def is_palindrome(s):
  # Convert to lowercase and remove non-alphanumeric characters
  cleaned_s = ''.join(char.lower() for char in s if char.isalnum())

  # Compare the cleaned string with its reverse
  return cleaned_s == cleaned_s[::-1]

print(f"'madam' is a palindrome: {is_palindrome('madam')}")
print(f"'A man, a plan, a canal: Panama' is a palindrome: {is_palindrome('A
man, a plan, a canal: Panama')}")
print(f"'hello' is a palindrome: {is_palindrome('hello')}")
print(f"'Racecar' is a palindrome: {is_palindrome('Racecar')}")
print(f"'No lemon, no melon' is a palindrome: {is_palindrome('No lemon, no
melon')}")
```

OUTPUT:

```
'madam' is a palindrome: True
'A man, a plan, a canal: Panama' is a palindrome: True
'hello' is a palindrome: False
'Racecar' is a palindrome: True
'No lemon, no melon' is a palindrome: True
```

CODE :(COPILOT GENERATED):

```
def is_palindrome(s):
    s = s.lower().replace(" ", "")  # normalize: lowercase and remove spaces
    return s == s[::-1]

# Example usage:
print(is_palindrome("madam"))        # True
print(is_palindrome("racecar"))      # True
print(is_palindrome("hello"))        # False
print(is_palindrome("A man a plan a canal Panama"))  # True
```

```
True
True
False
True
```

SIDE BY SIDE OBSERVATION TABLE :

Tool	Code Clarity	Simplicity	Readability
Gemini	High	Very simple	Easy to understand
Copilot	Medium	Slightly complex	More control

◇ Student Observation:

Gemini generated more concise and beginner-friendly code, while Copilot provided a detailed implementation with better input handling.

Task 4: Code Explanation Using AI

❖ Scenario:

You are reviewing unfamiliar code written by another developer.

❖ Task:

Ask Gemini to explain a Python function (prime check OR palindrome check) line by line.

❖ Expected Output:

➢ Code snippet

➢ AI explanation

➢ Student comments on understanding

CODE:

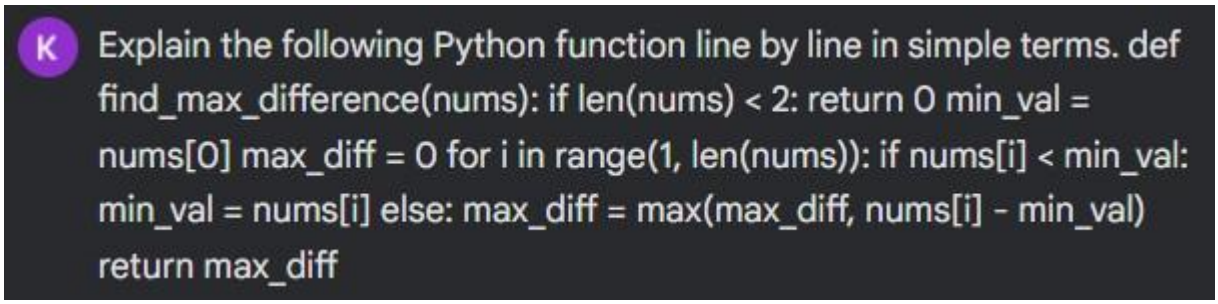
```python
def find_max_difference(nums):
    if len(nums) < 2:
        return 0

    min_val = nums[0]
    max_diff = 0

    for i in range(1, len(nums)):
        if nums[i] < min_val:
            min_val = nums[i]
        else:
            max_diff = max(max_diff, nums[i] - min_val)

    return max_diff
```

PROMPT:



AI EXPLAINATION:

Let's go through the find_max_difference function line by line:

1. **def find_max_difference(nums):**

- This line defines a new function called find_max_difference. A function is a block of organized, reusable code that performs a single, related action.
- nums is the input to this function. It's expected to be a list of numbers.

2. **if len(nums) < 2:**
   - This is a check to see if the nums list has fewer than 2 elements. ○ If a list has less than two numbers, you can't find a "difference" between two *different* numbers where the second number appears after the first, which is what this function is designed to do (finding the maximum difference between nums[j] - nums[i] where j > i).
3. **return 0**
   - If the list has less than 2 elements (as checked in the previous line), the function immediately stops and returns 0 because no meaningful difference can be calculated.
4. **min_val = nums[0]**
   - We initialize a variable called min_val with the value of the first number in the nums list.
   - This min_val will keep track of the smallest number encountered *so far* as we go through the list.
5. **max_diff = 0** ○ We initialize a variable called max_diff to 0. ○ This variable will store the largest difference we find between any number and the min_val encountered *before* it.
6. **for i in range(1, len(nums)):**
   - This line starts a loop that will go through each number in the nums list, starting from the *second* number (at index 1) up to the end of the list. ○ We start from the second number because we've already used the first number to initialize min_val.
7. **if nums[i] < min_val:**
   - Inside the loop, for each number nums[i], this line checks if the current number is smaller than the min_val we've tracked so far.
8. **min_val = nums[i]**

- If the current number nums[i] *is* smaller than min_val, it means we've found a new, smaller minimum value. So, we update min_val to this new smaller number.

max_diff = max(max_diff, nums[i] - min_val)

- In this case, nums[i] is a number that came *after* min_val (or is the same as min_val). We calculate the difference between the current number nums[i] and our min_val.
- Then, we compare this new difference with the max_diff we've found so far. The max() function picks the larger of the two values.
- max_diff is then updated to store the largest difference found up to this point.

9. **return max_diff**
    - After the loop has finished checking all numbers in the list, this line returns the final max_diff value, which represents the largest difference found between any two numbers nums[j] - nums[i] where j > i.

Student Understanding / Comments:

Initially, I found the logic confusing. After Gemini's explanation, I understood that the function finds the maximum difference between two elements such that the smaller number appears before the larger number. The explanation helped me understand how minimum tracking works.