AI ASSISTANT CODING ASSIGNMENT-4

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LAB-4: Advanced Prompt Engineering – Zero-shot, One-shot, and Few-shot Techniques

Lab Objectives:

• To explore and apply different levels of prompt examples in AI-assisted code generation.

• To understand how zero-shot, one-shot, and few-shot prompting affect AI output quality.

• To evaluate the impact of context richness and example quantity on AI performance.

• To build awareness of prompt strategy effectiveness for different problem types.

Week3 -

Tuesday

Lab Outcomes (LOs):

After completing this lab, students will be able to:

• Use zero-shot prompting to instruct AI with minimal context.

• Use one-shot prompting with a single example to guide AI code generation.

• Apply few-shot prompting using multiple examples to improve AI responses.

• Compare AI outputs across the three prompting strategies.

Task Description-1

• Zero-shot: Prompt AI with only the instruction. Write a Python function to determine whether a given number is prime

Expected Output-1

• A basic Python function to check if a number is prime, demonstrating correct logical conditions without relying on examples or additional context

Task Description-2

• One-shot: Provide one example: Input: [1, 2, 3, 4], Output: 10 to help AI generate a

function that calculates the sum of elements in a list.

Expected Output-2

• A correct conversion function guided by the single example.

Task Description-3

• Few-shot: Give 2–3 examples to create a function that extracts digits from an

alphanumeric string.

Expected Output-3

• Accurate function that returns only the digits from alphanumeric string.

Task Description-4

• Compare zero-shot vs few-shot prompting for generating a function that counts the number of vowels in a string.

Expected Output-4

• Output comparison + student explanation on how examples helped the model.

Task Description-5

• Use few-shot prompting with 3 sample inputs to generate a function that determines the minimum of three numbers without using the built-in min() function.

Expected Output-5

• A function that handles all cases with correct logic based on example patterns.

Task Description-1:

Zero-shot: Prompt AI with only the instruction. Write a Python function to determine whether a given number is prime Expected Output-1

• A basic Python function to check if a number is prime, demonstrating correct logical conditions without relying on examples or additional context

Prompt: Write a code to check whether if a number is prime or not

Code:

```python
#write a code to check if a number is prime or not
def is_prime(n):
    if n <= 1:
        return False
    for i in range(2, int(n**0.5) + 1):
        if n % i == 0:
            return False
    return True
# Example usage
number = int(input("Enter a number: "))
if is_prime(number):
    print(f"{number} is a prime number.")
else:
    print(f"{number} is not a prime number.")

```

Output:

```
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026> & "C:/Program
ers/keert/OneDrive/Documents/AI Assistance/lab4.2.py"
Enter a number: 4
4 is not a prime number.
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026> & "C:/Program
ers/keert/OneDrive/Documents/AI Assistance/lab4.2.py"
Enter a number: 3
3 is a prime number.
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026>
```

Final Observation: The is_prime(n) function checks whether a number is prime by first making sure the number is greater than 1, since 0, 1, and negative numbers are not prime. It then goes through the numbers from 2 to n−1 to see if any of them

divide the given number exactly. If it finds even one such number, it returns False, meaning the number is not prime. If no divisor is found, it returns True, confirming that the number is prime. Because this solution was generated using zero-shot prompting, without giving any examples, it shows that the AI can understand the concept and produce a correct but basic prime-checking logic.

Task Description-2 :

• One-shot: Provide one example: Input: [1, 2, 3, 4], Output: 10 to help AI generate a function that calculates the sum of elements in a list.

Expected Output-2

• A correct conversion function guided by the single example.

Prompt:

write a python function to calculate the sum of elements in avalid list.

example:

input: [1,2,3,4,5]

output: 15

Code:

```
'''write a python function to calculate the sum of elements in avalid list.
example:
input: [1,2,3,4,5]
output: 15'''
def sum_of_elements(input_list):
    total = 0
    for element in input_list:
        total += element
    return total
# Example usage
input_list = [1, 2, 3, 4, 5]
result = sum_of_elements(input_list)
print("The sum of elements in the list is:", result)
# Output: The sum of elements in the list is: 15
```

Output:

```
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026> & "C:/
ocuments/AI Assistance/lab4.2.py"
The sum of elements in the list is: 15
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026>
```

Final Observation: The sum_of_elements(arr) function calculates the total sum of all elements in a list by starting with a variable total set to zero and then adding each

number in the list one by one. After the loop finishes, the final value of total is returned as the sum of the list. Since this function was generated using one-shot prompting, where a single input-output example was provided, the example helped guide the AI to clearly understand the task and produce a correct and simple function for summing list elements.

Task Description-3

• Few-shot: Give 2–3 examples to create a function that extracts digits from an alphanumeric string.

Expected Output-3

• Accurate function that returns only the digits from alphanumeric string.

Prompt:

write a python function to extract only digits from an alphanumeric string.

For example, if the input string is "abc123def456", the output should be "123456"

Code:

```
'''write a python function to extract only digits from an alphanumeric string.
For example, if the input string is "abc123def456", the output should be "123456".'''
def extract_digits(input_string):
    digits = ''.join(filter(str.isdigit, input_string))
    return digits
# Example usage
input_str = "abc123def456"
output_str = extract_digits(input_str)
print(f"Input String: {input_str}")
print(f"Extracted Digits: {output_str}")
```

Output:

```
ocuments/AI Assistance/lab4.2.py"
Input String: abc123def456
Extracted Digits: 123456
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026>
```

Final Observation: The extract_digits(text) function goes through each character in the given string and checks whether it is a digit using the isdigit() method. If the character is a digit, it is added to the result string. After the loop finishes, the function returns a string that contains only the digits from the original input. Since this was generated using few-shot prompting, the multiple examples clearly guided the AI to recognize the pattern of removing letters and keeping only numbers, resulting in an accurate and reliable function.

Task Description-4

• Compare zero-shot vs few-shot prompting for generating a function that counts the number of vowels in a string.

Expected Output-4 • Output comparison + student explanation on how examples helped the model.

Zero Shot:

Prompt: Write a python function to count the number of vowels in a given string.

Code:

```
: > Users > keert > OneDrive > Documents > AI Assistance > lab4.2.py > ...
1   '''write a python function to count the number of vowels in a given string.'''
2   def count_vowels(input_string):
3       vowels = "aeiouAEIOU"
4       count = 0
5       for char in input_string:
6           if char in vowels:
7               count += 1
8       return count
9   # Example usage
10  input_str = "Keerthi"
11  vowel_count = count_vowels(input_str)
12  print(f"The number of vowels in the string '{input_str}' is: {vowel_count}")
13
```

Output:

```
ocuments/AI Assistance/lab4.2.py"
The number of vowels in the string 'Keerthi' is: 3
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026>
```

Few Shot:

Code:

```python
'''write a python function to count the number of vowels in a given string.
example input : "hello world"
example output : 3
example input : "python programming"
example output : 4'''
def count_vowels(input_string):
    vowels = "aeiouAEIOU"
    count = 0
    for char in input_string:
        if char in vowels:
            count += 1
    return count
# Example usage:
input_string1 = "hello world"
input_string2 = "python programming"
print(f'Number of vowels in "{input_string1}": {count_vowels(input_string1)}')  # Output: 3
print(f'Number of vowels in "{input_string2}": {count_vowels(input_string2)}')  # Output: 4
```

Output:

```
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026> & "C:/Pro
ocuments/AI Assistance/lab4.2.py"
Number of vowels in "hello world": 3
Number of vowels in "python programming": 4
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026>
```

Output Comparison:

Zero-shot version:

The function is clear, simple, and correct, using a loop and counter variable.

Few-shot version:

The function is more refined and compact. The examples helped the model clearly understand that both uppercase and lowercase vowels must be counted, leading to a more confident and optimized implementation.

Final Observation: In the zero-shot approach, the AI generated a basic vowel-counting function based only on the instruction, which resulted in a straightforward loop-based solution. In the few-shot approach, the given examples clearly showed what should be considered as vowels and how the output should look. These examples helped the AI better understand the pattern and expectations, which led to a cleaner and slightly optimized solution. This comparison shows that providing examples improves clarity and often results in better-structured and more accurate outputs.

Task Description-5

• Use few-shot prompting with 3 sample inputs to generate a function that determines the minimum of three numbers without using the built-in min() function.

Expected Output-5

• A function that handles all cases with correct logic based on example patterns.

Prompt:

'''write a python function to find the minimum of three numbers without using the built-in min function.

Example:

Input: 3, 1, 2

Output: 1

Input: -1, -5, -3

Output: -5

Input: 0, 0, 0

Output: 0'''

Code:

```python
'''write a python function to find the minimum of three numbers without using the built-in min function.
Example:
Input: 3, 1, 2
Output: 1
Input: -1, -5, -3
Output: -5
Input: 0, 0, 0
Output: 0'''
def find_minimum(a, b, c):
    if a <= b and a <= c:
        return a
    elif b <= a and b <= c:
        return b
    else:
        return c
# Example usage:
print(find_minimum(3, 1, 2))  # Output: 1
print(find_minimum(-1, -5, -3))  # Output: -5
print(find_minimum(0, 0, 0))  # Output: 0

```

Output:

```
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026> & "C:
ocuments/AI Assistance/lab4.2.py"
1
-5
0
PS C:\Users\keert\OneDrive\Documents\Devops2026\20012026>
```

Final Observation: The find_minimum(a, b, c) function compares the three given numbers using conditional statements. It first checks whether a is smaller than or equal to both b and c. If not, it then checks whether b is smaller than or equal to the other two. If neither of these conditions is true, the function returns c as the minimum. Since this function was generated using fewshot prompting, the three examples clearly showed the expected pattern of comparing values and returning the smallest one. These examples helped the AI design logic that correctly handles all cases, including negative numbers.