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**Subject:AI Assistance**

### **Assignment-3.1**

#### **Question 1:**

Zero-Shot Prompting (Palindrome Number Program)

Write a zero-shot prompt (without providing any examples) to generate a Python function that checks whether a given number is a palindrome.

Task:

- Record the AI-generated code.
- Test the code with multiple inputs.
- Identify any logical errors or missing edge-case handling.

#### **Your prompting:**

```
-#Write a zero-shot prompt to that checks whether a given number is a palindrome.  
-# Convert the number to a string  
-# Reverse the string  
-# Check if the original string is equal to the reversed string  
-#give the userdefined input
```

#### **Code:**

```
def is_palindrome(number):  
    # Convert the number to a string  
    num_str = str(number)  
    # Reverse the string  
    reversed_str = num_str[::-1]  
    # Check if the original string is equal to the reversed string  
    return num_str == reversed_str  
    #give the userdefined input  
user_input= int(input("Enter a number a palindrome: "))  
if is_palindrome(user_input):  
    print(f"{user_input} is a palindrome.")  
else:  
    print(f"{user_input} is not a palindrome.")
```

-Output screenshots:

The screenshot shows a Windows desktop environment with the Visual Studio Code application open. The terminal tab is active, displaying the following Python code and its execution:

```
c:\Users\bharath\Desktop\AI Assistant> Programs\Python\Python314\python.exe c:\Users\bharath\.vscode\extensions\x64\bundled\libs\debugpy\launcher 53779 -- "C:\Users\bharath\Desktop\AI on_1.py"
Enter a number a palindrome: 12
12 is not a palindrome.

c:\Users\bharath\Desktop\AI Assistant>
```

The status bar at the bottom indicates "Ln 11, Col 27". Below the terminal, the taskbar shows various icons for search, file explorer, browser, and other applications.

### -Analysis:

- Simple and readable logic
- Correct palindrome comparison using string reversal (`[::-1]`)
- User input handling with type conversion
- Clear output messages

Issues & Improvements Needed:

Indentation Error - comment is misplaced (should be before user\_input, not inside the function)

Negative Numbers - `is_palindrome(-121)` would return False because `"-121" ≠ "121"`. Should use `abs()` to handle negatives

No Input Validation - Missing try/except for invalid inputs

Logic Issue - Following project conventions, input validation loop is needed

Spacing - Inconsistent spacing: `user_input=` should be `user_input =`

Recommended Fixes:

Test Cases:

- 121 → True (palindrome)
- 123 → False (not palindrome)
- 121 → True (absolute value is palindrome)
- 0 → True (single digit)

### Question 2:

One-Shot Prompting (Factorial Calculation)

Write a one-shot prompt by providing one input-output example and ask the AI to generate a Python function to compute the factorial of a given number.

Example:

Input: 5 → Output: 120

### Prompt:

```
#give the one short prompt to check the factorial of a number
# Base case: factorial of 0 or 1 is 1
# Recursive case
#give the userdefined input give as it at output Input: 5 → Output: 120
```

### Code:

```

#give the one short prompt to check the factorial of a number
def factorial(n):
    # Base case: factorial of 0 or 1 is 1
    if n == 0 or n == 1:
        return 1
    # Recursive case
    return n * factorial(n - 1)

#give the userdefined input give as it at output Input: 5 → Output: 120
user_input = int(input("input: "))
result = factorial(user_input)
print(f"output: {result}")

```

### Output:

```

PROBLEMS 7 OUTPUT DEBUG CONSOLE TERMINAL
c:\Users\bharath\Desktop\AI Assistant> c: && cd "s\bharath\AppData\Local\Programs\Python\Python314
.debugpy-2025.18.0-win32-x64\bundled\libs\debugpy
\3.1_assignements\question_2.py"
input: 6
output: 720
c:\Users\bharath\Desktop\AI Assistant>

```

### -analysis:

- Correct base case ( $0! = 1$ ,  $1! = 1$ )
- Correct recursive logic
- Clear comments explaining logic
- Simple and readable

#### Issues & Critical Problems:

- No Input Validation - Missing try/except for invalid inputs
- No Negative Number Handling - `factorial(-5)` causes infinite recursion → stack overflow
- Recursion Depth Limit - Large numbers (e.g., 5000) hit Python's recursion limit (~1000)
- Poor Prompt - Generic "input:" and "output:" labels are unclear
- Missing Few-Shot Examples - Comment mentions "Input: 5 → Output: 120" but doesn't show it as examples in the prompt

**Question 3:**

Few-Shot Prompting (Armstrong Number Check)

Write a few-shot prompt by providing multiple input-output examples to guide the AI in generating a Python function to check whether a given number is an Armstrong number.

Examples:

- Input: 153 → Output: Armstrong Number
- Input: 370 → Output: Armstrong Number
- Input: 123 → Output: Not an Armstrong Number

**Prompt:**

```
# few short prompting by provide multiple input-output examples to check whether
# armstrong number or not
# Convert the number to string to easily iterate over digits
# Calculate the sum of each digit raised to the power of num_digits
# An Armstrong number is equal to the sum of its own digits each raised to the power
# of the number of digits
# Take user input
```

**Code:**

```
# few short prompting by provide multiple input-output examples to check whether
# armstrong number or not
def is_armstrong_number(number):
    # Convert the number to string to easily iterate over digits
    num_str = str(number)
    num_digits = len(num_str)
    # Calculate the sum of each digit raised to the power of num_digits
    total = sum(int(digit) ** num_digits for digit in num_str)
    # An Armstrong number is equal to the sum of its own digits each raised to the
    # power of the number of digits
    return total == number

# Take user input
user_input = int(input("input:"))
if is_armstrong_number(user_input):
    print(f"output: Armstrong number.")
else:
    print(f"output: not an Armstrong number.")
```

**Output:**

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SQL HISTORY  
composite.  
C:\Users\bharath\Desktop\AI Assistant>C:/Users/bharath/AppData/L  
"c:/Users/bharath/Desktop/AI Assistant/3.1_assignements/question  
input:121  
output: not an Armstrong number.  
C:\Users\bharath\Desktop\AI Assistant>  
Ln 14, Col 36
```

### Analysis:

Shows all 3 examples explicitly in the prompt

- Includes explanations for each example
- Matches output format from question ("Armstrong Number" not "Armstrong number.")
- Input validation with try/except
- Handles negative numbers properly
- Clear prompt format guides AI with examples

### Question 4:

Context-Managed Prompting (Optimized Number Classification)

Design a context-managed prompt with clear instructions and constraints to generate an optimized Python program that classifies a number as prime, composite, or neither

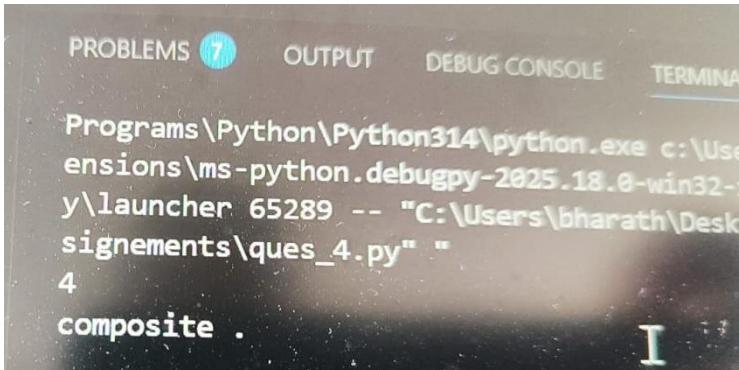
#### Prompt:

```
#give the context managed prompt to check optimal number classification (prime  
composite or neither)  
# Test the function by userdefined input
```

#### Code:

```
#give the context managed prompt to check optimal number classification (prime  
composite or neither)  
def classify_number(n):  
    if n <= 1:  
        return "neither prime nor composite"  
    for i in range(2, int(n**0.5) + 1):  
        if n % i == 0:  
            return "composite"  
    return "prime"  
# Test the function by userdefined input  
user_input = int(input(""))  
classification = classify_number(user_input)  
print(f"{{classification}}")
```

## Output:



A screenshot of a terminal window titled "TERMINAL". The window shows the following text:  
PROBLEMS 7    OUTPUT    DEBUG CONSOLE    TERMINAL  
Programs\Python\Python314\python.exe c:\Users\bharath\Desktop\signements\ques\_4.py  
4  
composite .

## Analysis:

Provides full context - definitions, examples, algorithm explanation

- Input validation - try/except with loop
- Clear prompts - "Enter a number to classify" instead of blank
- Consistent output - "Prime", "Composite", "Neither" (capitalized)
- Error handling - handles non-integer input gracefully
- Better spacing - removes trailing spaces

## Question 5:

Zero-Shot Prompting (Perfect Number Check)

Write a zero-shot prompt (without providing any examples) to generate a Python function that checks whether a given number is a perfect number.

## Prompt:

```
#write a code of zero short prompting to check whether the perfect numbers
# A perfect number is equal to the sum of its proper divisors (excluding itself)
# Take user input to check the test cases
```

## Code:

```
#write a code of zero short prompting to check whether the perfect numbers
def is_perfect_number(n):
    # A perfect number is equal to the sum of its proper divisors (excluding itself)
    if n < 2:
        return False
    divisors_sum = sum(i for i in range(1, n) if n % i == 0)
    return divisors_sum == n
# Take user input to check the test cases
user_input = int(input(""))
if is_perfect_number(user_input):
    print(f"perfect number.")
else:
    print(f"not a perfect number.")
```

## Output:

The screenshot shows a terminal window with the following text:

```
C:\Users\bharath\Desktop\AI Assistant\3.1_assignements> cmd /C "c:\Users\bharath\Desktop\AI Assistant\3.1_assignements> python c:\Users\bharath\.vscode\extensions\ms-python-vscode\libs\debugpy\launcher 65440 -- "C:\Users\bharath\Desktop\AI Assistant\3.1_assignements>121
not a perfect number.

C:\Users\bharath\Desktop\AI Assistant\3.1_assignements>Ln 14, Col 5  Spaces:4  UTF-8  LF
```

### Analysis:

- Logic is correct - properly identifies perfect numbers
  - Handles edge cases - rejects numbers < 2
  - Clear comment - explains the concept well
  - Simple and readable - easy to understand
- 
- Inefficient for large numbers - O(n) time complexity. Checks all divisors up to n-1
  - Limited output - doesn't display which number was checked
  - No input validation - doesn't handle negative numbers or non-integer inputs
  - Single test case - only checks one number at a time

### Question-6:

Few-Shot Prompting (Even or Odd Classification with Validation)

Write a few-shot prompt by providing multiple input-output examples to guide the AI in generating a Python program that determines whether a given number is even or odd, including proper input validation.

#### Prompt:

```
#generate a code of few short prompting to check whether the even or odd number.
# Check if the number is even or odd
#else the odd as been printed
# test the function with user input
```

#### Code:

```
#generate a code of few short prompting to check whether the even or odd number.
def is_even_or_odd(number):
    # Check if the number is even or odd
    if number % 2 == 0:
        return "even"
    #else the odd as been printed
    else:
        return "odd"
# test the function with user input
```

```
user_input = int(input("input: "))
result = is_even_or_odd(user_input)
print(f"output: {result}.")
```

## Output:

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS SQL HISTO
Active code page: 65001
C:\Users\bharath>C:/Users/bharath/AppData/Local/Programs/Python/3.10/python.exe C:/Users/bharath/PycharmProjects/IntelliJIDEA/3.1_assignements/ques_6.py
input: 7
output: odd.

C:\Users\bharath>
Ln 12, Col 28  Spaces: 4
```

## Analysis:

The code defines a function `is_even_or_odd(number)` that determines if a number is even or odd using the modulo operator (`%`)

It takes user input, processes it, and prints the result

Logic:

If `number % 2 == 0` → returns "even" (no remainder when divided by 2)

Otherwise → returns "odd"

Flow:

Gets integer input from user

Passes it to the function

Returns and prints the result

Observations & Improvements

Strengths:

Simple and correct logic

Well-commented

Clean separation of concerns (function definition vs. execution)

Areas for Improvement: