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Subject: Ai Assistant

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.

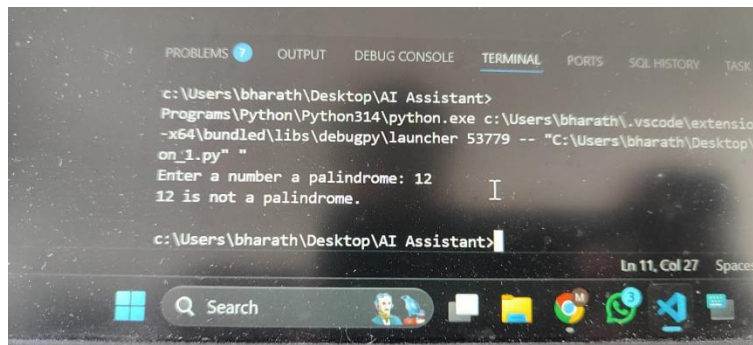
Your prompting:

```
-#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:



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

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

-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

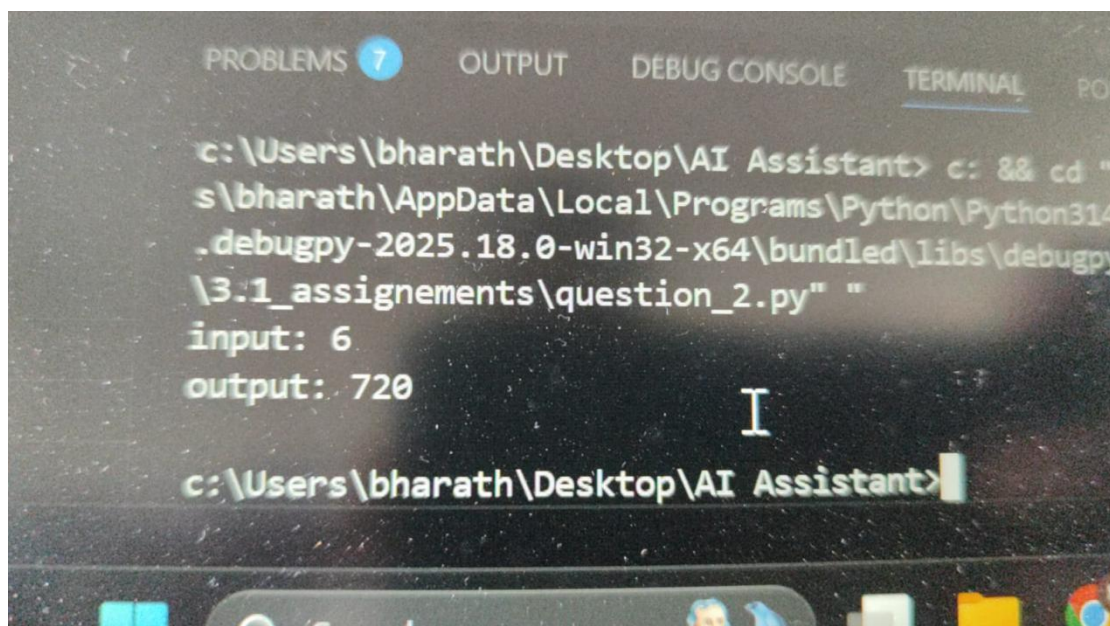
Recursive case

#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_assignments\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

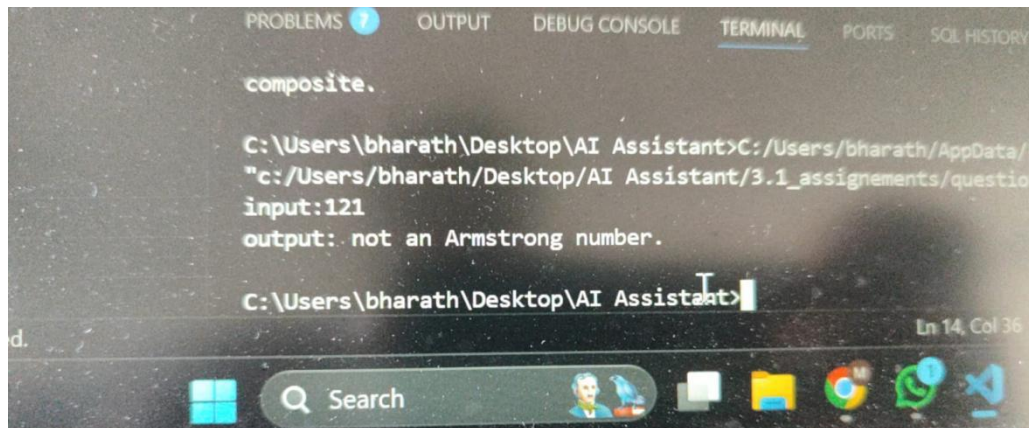
Prompt:

```
# 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:



```
composite.  
  
C:\Users\bharath\Desktop\AI Assistant>C:/Users/bharath/AppData/L  
"c:/Users/bharath/Desktop/AI Assistant/3.1_assignments/question  
input:121  
output: not an Armstrong number.  
  
C:\Users\bharath\Desktop\AI Assistant>
```

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"
```

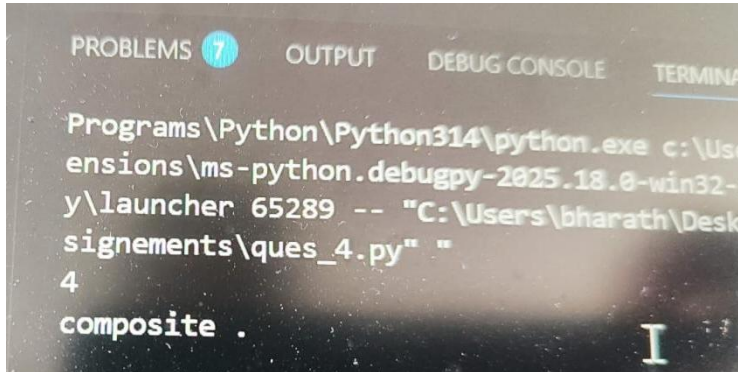
Test the function by userdefined input

```
user_input = int(input(""))
```

```
classification = classify_number(user_input)
```

```
print(f"{classification}.")
```

Output:



```
PROBLEMS 7 OUTPUT DEBUG CONSOLE TERMINAL
Programs\Python\Python314\python.exe c:\Use
ensions\ms-python.debugpy-2025.18.8-win32-x
y\launcher 65289 -- "C:\Users\bharath\Desk
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.

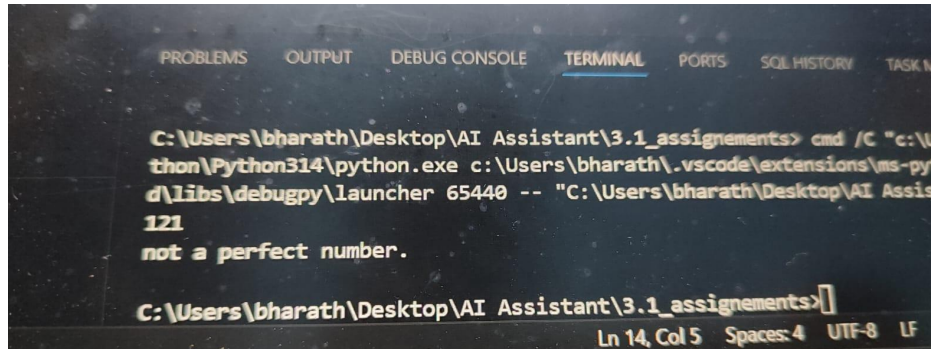
Prompt:

```
#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:



```
C:\Users\bharath\Desktop\AI Assistant\3.1_assignments> cmd /C "c:\Users\bharath\Desktop\AI Assistant\3.1_assignments\python.exe c:\Users\bharath\Desktop\AI Assistant\3.1_assignments\perfect.py 121"
121
not a perfect number.
C:\Users\bharath\Desktop\AI Assistant\3.1_assignments>
```

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
```

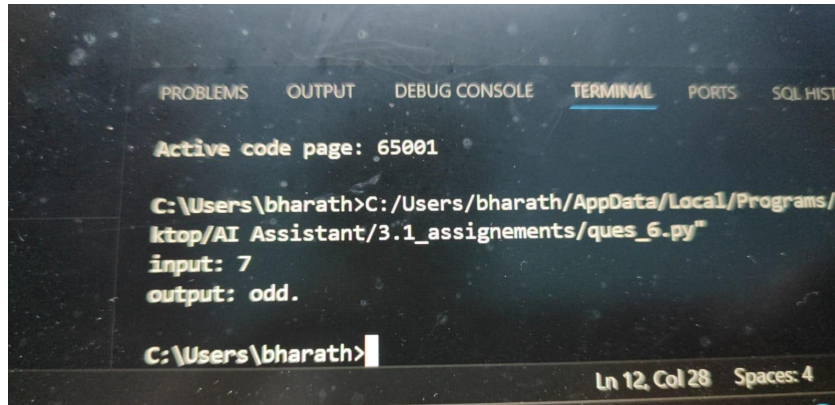
Code:

```
#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/Python310/Python.exe C:/Users/bharath/AppData/Local/Programs/Python/Python310/Scripts/python C:/Users/bharath/AppData/Local/Programs/Python/Python310/Python.exe ktop/AI Assistant/3.1_assignments/ques_6.py
input: 7
output: odd.
C:\Users\bharath>
```

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: