

# **ASSIGNMENT – 3.4**

**NAME : s.harshavardhan**

**HT.NO : 2303A51563**

**BATCH : 10**

**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.

**PROMPT :** check whether the given number is palindrome or not in python.

The screenshot shows a code editor with a Python file named `Assignment_3.1.py`. The code implements a simple palindrome check without using functions. It prompts the user for a number, converts it to a string, and then compares it with its reverse using slice notation `[::-1]`.

```
# Simple palindrome check without functions
# Get number from user
num = int(input("Enter a number: "))

# Convert to string to check
num_str = str(abs(num))

# Check if palindrome by comparing with reverse
if num_str == num_str[::-1]:
    print(f"{num} is a palindrome")
else:
    print(f"{num} is not a palindrome")
```

In the top right corner, there is a Chat interface titled "PALINDROME CHECK FOR A NUMBER IN PYTHON". A message from "AI Assistant Coding" asks, "check whether the given number is palindrome or not in python". Below this, the AI responds with "I'll create a Python solution to check if a number is a palindrome:" and "Created Assignment\_3.1.py". The AI also states, "Done! I've created a complete palindrome checker for you. The solution includes:" followed by a list of features.

**How it works:**

- Converts the number to a string and removes the negative sign (if any)
- Compares the string with its reverse using slice notation `[::-1]`
- Returns `True` if it's a palindrome, `False` otherwise

**Key features:**

- Handles negative numbers (treats `-121` as `121`)
- Includes test cases to verify functionality
- Has an interactive input section to check numbers manually

At the bottom, there is a "Describe what to build next" field and a "Agent" dropdown set to "Auto".

The screenshot shows a VS Code interface with the following details:

- File Explorer:** Shows a file tree with `Assignment_3.1.py` as the active file.
- Code Editor:** Displays the following Python code:

```
1  # Simple palindrome check without functions
2
3  # Get number from user
4  num = int(input("Enter a number: "))
5
6  # Convert to string to check
7  num_str = str(abs(num))
8
9  # Check if palindrome by comparing with reverse
10 if num_str == num_str[::-1]:
11     print(f"{num} is a palindrome")
12 else:
13     print(f"{num} is not a palindrome")
```
- Terminal:** Shows command-line output for running the script in Python 3.12. The terminal pane has multiple tabs open, with the current tab showing the execution of `Assignment_3.1.py`.
- Output:** Shows standard output from the script execution.
- Search:** A search bar at the top with the query "AI Assistant Coding".
- Chat:** An AI Assistant Coding interface with the following conversation:
  - User: "PALINDROME CHECK FOR A NUMBER IN PYTHON"
  - AI: "check whether the given number is palindrome or not in python"
- Status Bar:** Shows the current file is `Assignment_3.1.py`, the line and column are 14, 1, the space count is 4, the file is in UTF-8 encoding, it's a Python file, and the Python version is 3.12 (64-bit).

## 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

Task:

- Compare the generated code with a zero-shot solution.
- Examine improvements in clarity and correctness.

PROMPT : Generate a Python function to compute the factorial of a given number.

Example:

Input: 5 → Output: 120

A screenshot of the Visual Studio Code (VS Code) interface. The top bar shows the title "File Edit Selection View Go Run ...". A search bar contains the text "AI Assistant Coding". The main editor window displays Python code for a factorial calculator. The code includes error handling for negative numbers and a loop to calculate the factorial. The terminal at the bottom shows the execution of the script and its output. The status bar at the bottom right indicates "Python 3.12 (64-bit)" and the date "12-01-2026".

```
Assignment_3.1.py
Assignment_3.1.py > ...
13     print(f"{num} is not a palindrome")
14
15 # TASK - II
16 # Factorial calculation without functions
17
18 print("\n--- Factorial Calculation ---")
19
20 n = int(input("Enter a number for factorial: "))
21
22 if n < 0:
23     print("Factorial not defined for negative numbers")
24 elif n == 0 or n == 1:
25     print(f"Factorial of {n} = 1")
26 else:
27     result = 1
28     for i in range(2, n + 1):
29         result *= i
30     print(f"Factorial of {n} = {result}")
31
32 # Example: Input 5 -> Output 120
33 print("\nExample: Factorial of 5 = 120")
```

A second screenshot of the VS Code interface, similar to the first but with a different configuration. The terminal output shows a different path and command being used to run the script. The status bar at the bottom right indicates "Python 3.12 (64-bit)" and the date "12-01-2026".

```
Assignment_3.1.py
Assignment_3.1.py > ...
20 n = int(input("Enter a number for factorial: "))
21
22 if n < 0:
23     print("Factorial not defined for negative numbers")
24 elif n == 0 or n == 1:
25     print(f"Factorial of {n} = 1")
26 else:
27     result = 1
28     for i in range(2, n + 1):
29         result *= i
30     print(f"Factorial of {n} = {result}")
31
32 # Example: Input 5 -> Output 120
33 print("\nExample: Factorial of 5 = 120")
```

## 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

Task:

- Analyze how multiple examples influence code structure and accuracy.
- Test the function with boundary values and invalid inputs.

PROMPT : 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

```

35 # TASK - III
36 # Armstrong Number check without functions
37 # Armstrong number: sum of digits raised to power of number of digits
38
39 print("\n--- Armstrong Number Check ---")
40
41 num = int(input("Enter a number: "))
42
43 # Convert to string to get digits
44 num_str = str(num)
45 num_digits = len(num_str)
46
47 # Calculate sum of each digit raised to power of total digits
48 sum_of_powers = 0
49 for digit in num_str:
50     sum_of_powers += int(digit) ** num_digits
51
52 # Check if Armstrong number
53 if sum_of_powers == num:
54     print(f"{num} is an Armstrong Number")
55 else:
56     print(f"{num} is Not an Armstrong Number")
57
58 # Examples
59 print("\nExamples:")
60 print("153 is an Armstrong Number (1^3 + 5^3 + 3^3 = 153)")
61 print("370 is an Armstrong Number (3^3 + 7^3 + 0^3 = 370")
62 print("123 is Not an Armstrong Number (1^3 + 2^3 + 3^3 = 36)")
63

```

✓ Read Python file  
 ✓ Edited Assignment\_3.1.py +28 -0  
 Done! Added TASK - III to check Armstrong numbers without functions.

**How it works:**

- Gets the number of digits
- Raises each digit to that power and sums them
- If the sum equals the original number, it's an Armstrong number
- Examples:  $153 = 1^3 + 5^3 + 3^3$ ,  $370 = 3^3 + 7^3 + 0^3$

C ↻ ⌂ ⌂ 1 file changed +29 -1 Keep Undo ↻ 1 of 1 ↑ ↓ Claude Haiku 4.5 + tx

Describe what to build next  
 Agent Auto 🚧

Ln 63, Col 1 Spaces:4 UTF-8 CRLF {} Python Python 3.12 (64-bit) ↻

08:09 PM 12-01-2026

```

31
32 # Example: Input 5 → Output 120
33 print("\nExample: Factorial of 5 = 120")
34
35 # TASK - III
36 # Armstrong Number check without functions
37 # Armstrong number: sum of digits raised to power of number of digits
38
39 print("\n--- Armstrong Number Check ---")
40
41 num = int(input("Enter a number: "))
42
43 # Convert to string to get digits
44 num_str = str(num)
45 num_digits = len(num_str)

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS powershell + ⌂ ⌂ ... | ⌂ x

PS C:\Users\rishi\OneDrive\Desktop\UNI\SEM - VI\AI Assistant Coding> & C:\Users\rishi\AI\ppData\Local\Programs\Python\Python312\python.exe "c:/Users/rishi/OneDrive/Desktop/UNI/SEM - VI/AI Assistant Coding/Assignment\_3.1.py"

--- Armstrong Number Check ---  
 Enter a number: 234  
 234 is Not an Armstrong Number

Examples:  
 153 is an Armstrong Number ( $1^3 + 5^3 + 3^3 = 153$ )  
 370 is an Armstrong Number ( $3^3 + 7^3 + 0^3 = 370$ )  
 123 is Not an Armstrong Number ( $1^3 + 2^3 + 3^3 = 36$ )

PS C:\Users\rishi\OneDrive\Desktop\UNI\SEM - VI\AI Assistant Coding>

77 ↻ ⌂ ⌂ 0 + Assignment\_3.1.py Describe what to build next Agent Auto 🚧

Ln 1, Col 4 Spaces:4 UTF-8 CRLF {} Python Python 3.12 (64-bit) ↻

08:10 PM 12-01-2026

## (Optional Extension)

### 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.

Task:

- Ensure proper input validation.
- Optimize the logic for efficiency.
- Compare the output with earlier prompting strategies.

PROMPT : Write a Python program to classify a number as prime, composite, or neither. Ensure proper input validation and handle edge cases like 0, 1, and negatives. Use an optimized logic by checking factors only up to  $\sqrt{n}$ .

The screenshot shows the AI Assistant Coding interface. On the left, a code editor displays a Python file named 'Assignment\_3.1.py' with the following content:

```
65 print("\n--- Prime, Composite, or Neither ---")
66
67 num = int(input("Enter a number: "))
68
69 # Handle edge cases
70 if num < 0:
71     print(f"{num} is Neither (negative numbers are neither prime nor composite)")
72 elif num == 0 or num == 1:
73     print(f"{num} is Neither (0 and 1 are neither prime nor composite)")
74 elif num == 2:
75     print(f"{num} is Prime (only even prime number)")
76 else:
77     # Check if prime by testing factors up to √n
78     is_prime = True
79     i = 2
80
81     while i * i <= num:
82         if num % i == 0:
83             is_prime = False
84             break
85         i += 1
86
87     if is_prime:
88         print(f"{num} is Prime")
89     else:
90         print(f"{num} is Composite")
91
92
93 # Test environment
```

On the right, a sidebar titled 'PALINDROME CHECK FOR A NUMBER IN PYTHON' contains the following text:

Write a Python program to classify a number as prime, composite, or neither. Ensure proper input validation and handle edge cases like 0, 1, and negatives. Use an optimized logic by checking factors only up to  $\sqrt{n}$ .

Below this, a summary of the task is provided:

- ✓ Read Python assignment file
- ✓ Edited Assignment\_3.1.py +37 -2

Done! Added TASK - IV with optimized prime/composite classification.

**Key features:**

- Edge cases handled: negatives, 0, 1 → classified as "Neither"
- Special case: 2 is Prime (only even prime)
- Optimized logic: Only checks factors up to  $\sqrt{n}$  using `while i * i <= num`
- Input validation: Classifies any number correctly as Prime, Composite, or Neither

This approach is efficient because checking up to  $\sqrt{n}$  is enough—if a number has a factor greater than  $\sqrt{n}$ , it must also have a corresponding factor less than  $\sqrt{n}$ .

At the bottom, there are buttons for 'Keep', 'Undo', and 'Describe what to build next'. The status bar at the bottom of the window shows 'Ln 100, Col 22 Spaces: 4 UTF-8 {} Python Python 3.12 (64-bit)' and the date/time '12-01-2026 08:13 PM'.

The screenshot shows a code editor interface with the following details:

- File Explorer:** Shows files like `Assignment_3.1.py` and `Assignment_3.1.py > ...`.
- Code Editor:** Displays the following Python code:

```

88     if is_prime:
89         print(f'{num} is Prime')
90     else:
91         print(f'{num} is Composite')
92
93 # Test examples
94 print("\nExamples:")
95 print("0 → Neither")
96 print("1 → Neither")
97 print("2 → Prime")
98 print("17 → Prime")
99 print("0 → Composite")
100 print("-5 → Neither")

```
- Terminal:** Shows the command `python Assignment_3.1.py` being run, with output:

```

PS C:\Users\rishi\OneDrive\Desktop\UNI\SEM - VI\AI Assistant Coding> & C:\Users\rishi\OneDrive\Desktop\UNI\SEM> python Assignment_3.1.py
Enter a number: 335
335 is Composite

Examples:
0 → Neither
1 → Neither
2 → Prime
17 → Prime
20 → Composite
-5 → Neither

```
- Chat Panel:** A task titled "PALINDROME CHECK FOR A NUMBER IN PYTHON" is shown with the following prompt:

Write a Python program to classify a number as prime, composite, or neither. Ensure proper input validation and handle edge cases like 0, 1, and negatives. Use an optimized logic by checking factors only up to  $\sqrt{n}$ .
- Bottom Status Bar:** Shows system information like battery level (77%), system tray icons, and the date/time (12-01-2026, 08:13 PM).

## 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.

Task:

- Record the AI-generated code.
- Test the program with multiple inputs.
- Identify any missing conditions or inefficiencies in the logic.

PROMPT : check whether the number is perfect number or not in python.

The screenshot shows a code editor with Python code for checking if a number is perfect. The code iterates through divisors from 1 to num-1, sums them, and compares the sum with the original number. It also includes examples for numbers 6, 28, and 10.

```

104     # Perfect number: equals the sum of its proper divisors (divisors except itself)
105
106     print("\n--- Perfect Number Check ---")
107
108     num = int(input("Enter a number: "))
109
110     if num <= 0:
111         print(f"{num} is Not a Perfect Number (must be positive)")
112     else:
113         # Find sum of all divisors except the number itself
114         sum_of_divisors = 0
115
116         for i in range(1, num):
117             if num % i == 0:
118                 sum_of_divisors += i
119
120         # Check if perfect number
121         if sum_of_divisors == num:
122             print(f"{num} is a Perfect Number")
123             print(f"Divisors of {num}: 1 to {num-1}, Sum = {sum_of_divisors}")
124         else:
125             print(f"{num} is Not a Perfect Number")
126             print(f"Sum of divisors: {sum_of_divisors}")
127
128     # Examples
129     print("\nExamples:")
130     print("6 is Perfect (1 + 2 + 3 = 6)")
131     print("28 is Perfect (1 + 2 + 4 + 7 + 14 = 28)") Keep Undo ⌘ 1 of 1 ↑ ↓
132     print("10 is Not Perfect (1 + 2 + 5 = 8)")

    
```

The AI Assistant Coding interface shows the following details:

- CHAT: PALINDROME CHECK FOR A NUMBER IN PYTHON
- check whether the number is perfect number or not in python
- Read Python file
- Edited Assignment\_3.1.py +33 -0
- Done! Added TASK - V to check for perfect numbers.
- How it works:**
  - A perfect number equals the sum of its proper divisors (all divisors except itself)
  - Finds all divisors from 1 to n-1
  - Sums them and compares with the original number
  - Handles edge cases: negative numbers and 0
- Examples:**
  - 6 is Perfect (1 + 2 + 3 = 6)
  - 28 is Perfect (1 + 2 + 4 + 7 + 14 = 28)
  - 10 is Not Perfect (1 + 2 + 5 = 8)

The screenshot shows a terminal window running the Python script. The output shows the program prompting for a number, receiving input, and calculating the sum of divisors. The AI Assistant Coding interface is visible at the top.

```

PS C:\Users\rishi\OneDrive\Desktop\UNI\SEM - VI\AI Assistant Coding> & C:\Users\rishi\Ap
ppData\Local\Programs\Python\Python312\python.exe "c:/Users/rishi/OneDrive/Desktop/UNI/
SEM - VI/AT Assistant Coding/Assignment_3.1.py"
--- Perfect Number Check ---
Enter a number: 87
87 is Not a Perfect Number
Sum of divisors: 33

Examples:
6 is Perfect (1 + 2 + 3 = 6)
28 is Perfect (1 + 2 + 4 + 7 + 14 = 28)
10 is Not Perfect (1 + 2 + 5 = 8)

    
```

The AI Assistant Coding interface shows the following details:

- CHAT: PALINDROME CHECK FOR A NUMBER IN PYTHON
- check whether the number is perfect number or not in python
- Read Python file
- Edited Assignment\_3.1.py +33 -0
- Done! Added TASK - V to check for perfect numbers.
- How it works:**
  - A perfect number equals the sum of its proper divisors (all divisors except itself)
  - Finds all divisors from 1 to n-1
  - Sums them and compares with the original number
  - Handles edge cases: negative numbers and 0
- Examples:**
  - 6 is Perfect (1 + 2 + 3 = 6)
  - 28 is Perfect (1 + 2 + 4 + 7 + 14 = 28)
  - 10 is Not Perfect (1 + 2 + 5 = 8)

## 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.

Examples:

- Input: 8 → Output: Even
- Input: 15 → Output: Odd
- Input: 0 → Output: Even

Task:

- Analyze how examples improve input handling and output clarity.
- Test the program with negative numbers and non-integer inputs.

PROMPT : Python program that determines whether a given number is even or odd, including proper input validation.

Examples:

- Input: 8 → Output: Even
- Input: 15 → Output: Odd
- Input: 0 → Output: Even

A screenshot of a code editor window titled "Assignment\_3.1.py". The code implements a simple function to check if a number is even or odd, including input validation using a try-except block. The code editor has a dark theme with syntax highlighting. A sidebar on the right contains a "CHAT" section with a task description about palindrome checking, examples, key features, and a status bar at the bottom.

```
132 print("10 is Not Perfect (1 + 2 + 5 = 8)")  
133  
134 # TASK - VI  
135 # Even or Odd number check with input validation  
136  
137 print("\n--- Even or Odd Check ---")  
138  
139 try:  
140     num = int(input("Enter a number: "))  
141  
142     if num % 2 == 0:  
143         print(f"{num} is Even")  
144     else:  
145         print(f"{num} is Odd")  
146  
147 except ValueError:  
148     print("Invalid input! Please enter a valid integer.")  
149  
150 # Examples  
151 print("\nExamples:")  
152 print("8 → Even")  
153 print("15 → Odd")  
154 print("0 → Even")  
155 print("-3 → Odd")  
156 print("-4 → Even")  
157  
158 |
```

CHAT  
PALINDROME CHECK FOR A NUMBER IN PYTHON  
Examples:  
• Input: 8 → Output: Even  
• Input: 15 → Output: Odd  
• Input: 0 → Output: Even

✓ Read Python file  
✓ Edited Assignment\_3.1.py +23 -0  
Done! Added TASK - VI to check if a number is even or odd.  
Key features:  
• Simple modulo check: `num % 2 == 0` for even, else odd  
• **Input validation:** `try-except` catches invalid inputs  
• Handles all cases: positive, negative, and zero  
• Examples show it works for all scenarios

Keep Undo ⌘ 1 of 1 ↑ ↓

Ln 158, Col 1 Spaces: 4 UTF-8 {} Python Python 3.12 (64-bit) 08:15 PM 12-01-2026

A screenshot of a code editor window titled "Assignment\_3.1.py". The code is identical to the one in the first screenshot. In addition to the code editor, a terminal window is visible at the bottom, showing the execution of the script and its output. The terminal shows the user entering a number (34) and the program outputting "34 is Even". The status bar at the bottom indicates the terminal is active.

```
135 # Even or Odd number check with input validation  
136  
137 print("\n--- Even or Odd Check ---")  
138  
139 try:  
140     num = int(input("Enter a number: "))  
141  
142     if num % 2 == 0:  
143         print(f"{num} is Even")  
144     else:  
145         print(f"{num} is Odd")  
146  
147 except ValueError:  
148     print("Invalid input! Please enter a valid integer.")  
149  
PS C:\Users\rishi\OneDrive\Desktop\UNI\SEM - VI\AI Assistant Coding> & C:\Users\rishi\OneDrive\Desktop\UNI\SEM - VI\AI Assistant Coding\Assignment_3.1.py  
--- Even or Odd Check ---  
Enter a number: 34  
34 is Even  
Examples:  
8 → Even  
15 → Odd  
0 → Even  
-3 → Odd  
-4 → Even
```

CHAT  
PALINDROME CHECK FOR A NUMBER IN PYTHON  
Determines whether a given number is even or odd, including proper input validation.  
Examples:  
• Input: 8 → Output: Even  
• Input: 15 → Output: Odd  
• Input: 0 → Output: Even

✓ Read Python file  
✓ Edited Assignment\_3.1.py +23 -0  
Done! Added TASK - VI to check if a number is even or odd.  
Key features:  
• Simple modulo check: `num % 2 == 0` for even, else odd  
• **Input validation:** `try-except` catches invalid inputs  
• Handles all cases: positive, negative, and zero  
• Examples show it works for all scenarios

Keep Undo ⌘ 1 of 1 ↑ ↓

Ln 135, Col 30 Spaces: 4 UTF-8 CRLF {} Python Python 3.12 (64-bit) 08:16 PM 12-01-2026