

## Assignment 3.1

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Batch - 14

# Lab Experiment: Prompt Engineering – Improving Prompts and Context Management

## Question 1: Zero-Shot Prompting (Palindrome Number Program)

### Prompt:

Write a Python function that checks whether a given number is a palindrome and returns True or False.

### Code & Output:



```
lab-3.1.py > ...
1  #Generate a Python function that checks whether a given number is a palindrome
2  #and returns True or False
3  def is_palindrome_number(num):
4      return str(num) == str(num)[::-1]
5  num = int(input("Enter a number : "))
6  print(f"{num} : {is_palindrome_number(num)}")
7

Problems  Output  Debug Console  Terminal  Ports
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number : 23432
23432 : True
PS C:\Users\danda\OneDrive\Documents\3.2\AIA>
```

### Explanation:

- Define a function called `is_palindrome_number` that takes a single argument `num`.
- Convert the number to a string using `str(num)`
- Reverse the string using `[::-1]`
- Compare the original string with the reversed string using `==`
- Return the result of the comparison
- Print the result of the function call

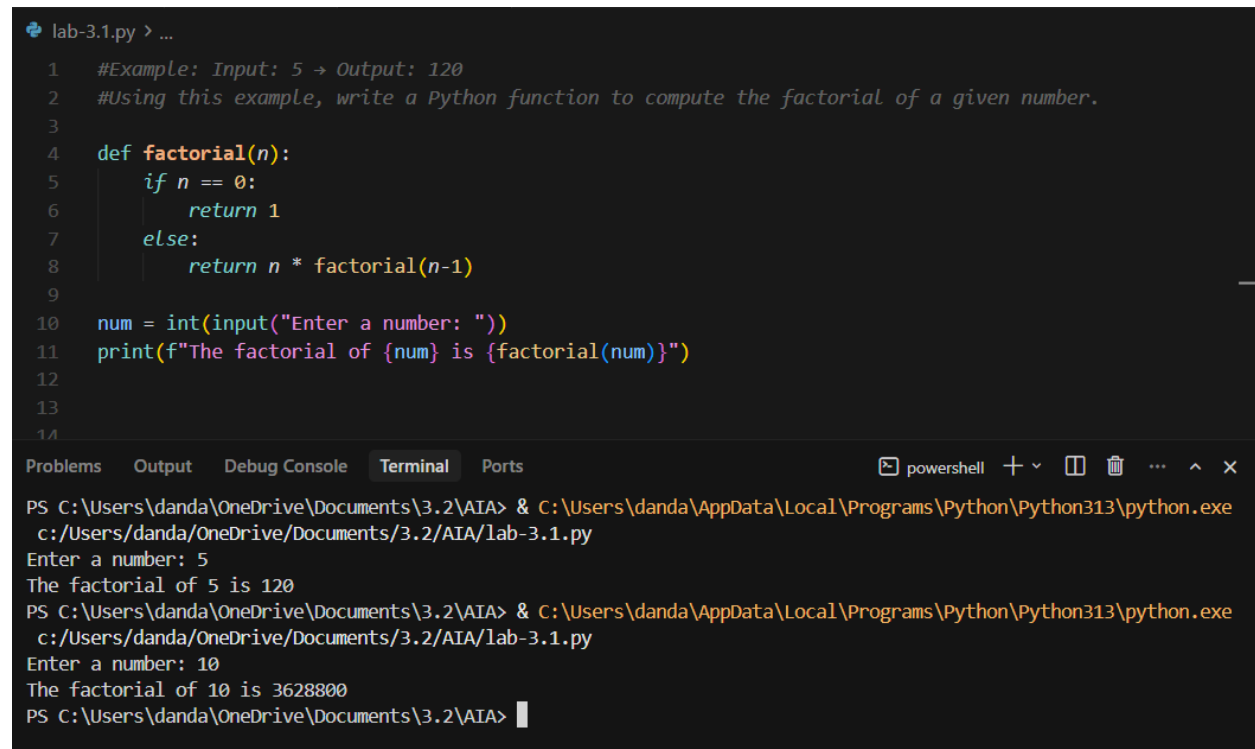
## Question 2: One-Shot Prompting (Factorial Calculation)

### Prompt:

*Example: Input: 5 → Output: 120*

*Using this example, write a Python function to compute the factorial of a given number.*

### Code & Output :



```

lab-3.1.py > ...
1  #Example: Input: 5 → Output: 120
2  #Using this example, write a Python function to compute the factorial of a given number.
3
4  def factorial(n):
5      if n == 0:
6          return 1
7      else:
8          return n * factorial(n-1)
9
10 num = int(input("Enter a number: "))
11 print(f"The factorial of {num} is {factorial(num)}")
12
13
14

```

Problems Output Debug Console Terminal Ports

powershell + - [ ] [x] ... ^ x

```

PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 5
The factorial of 5 is 120
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 10
The factorial of 10 is 3628800
PS C:\Users\danda\OneDrive\Documents\3.2\AIA>

```

### Explanation:

- Define a function called `factorial` that takes a single argument `n`.
- If `n` is 0, return 1

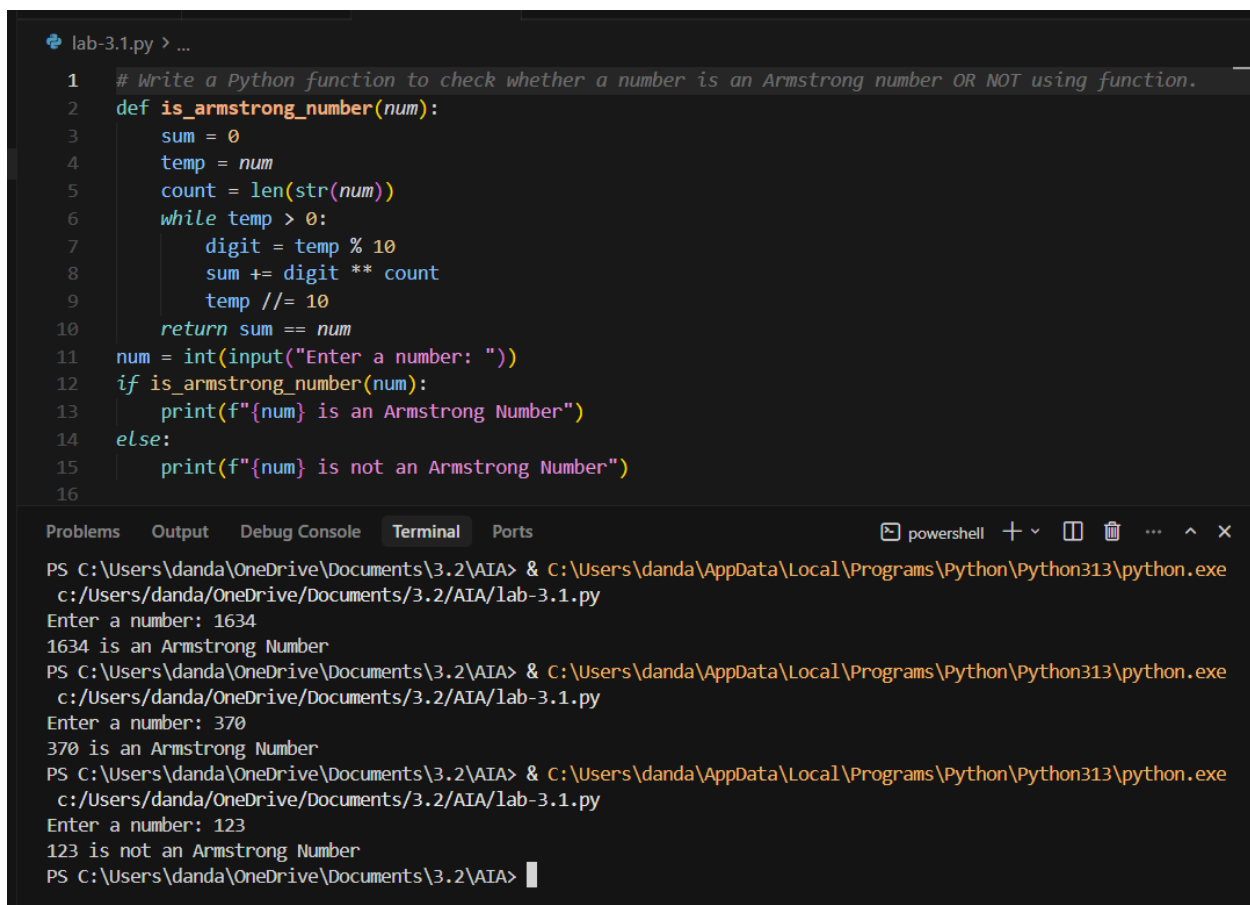
- Else, return  $n * \text{factorial}(n-1)$
- Print the result of the function call

## Question 3: Few-Shot Prompting (Armstrong Number Check)

### Prompt:

*Write a Python function to check whether a number is an Armstrong number.*

### Code & Output:



```

lab-3.1.py > ...
1  # Write a Python function to check whether a number is an Armstrong number OR NOT using function.
2  def is_armstrong_number(num):
3      sum = 0
4      temp = num
5      count = len(str(num))
6      while temp > 0:
7          digit = temp % 10
8          sum += digit ** count
9          temp //= 10
10     return sum == num
11 num = int(input("Enter a number: "))
12 if is_armstrong_number(num):
13     print(f"{num} is an Armstrong Number")
14 else:
15     print(f"{num} is not an Armstrong Number")
16
Problems  Output  Debug Console  Terminal  Ports
powershell + - [] [X] ... ^ X
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 1634
1634 is an Armstrong Number
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 370
370 is an Armstrong Number
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 123
123 is not an Armstrong Number
PS C:\Users\danda\OneDrive\Documents\3.2\AIA>

```

### Explanation:

- Define a function called `is_armstrong_number` that takes a single argument `num`.
- Initialize a variable called `sum` to 0.
- Initialize a variable called `temp` to `num`.
- Initialize a variable called `count` to the length of the number.

- ### Question 4: Context-Managed Prompting (Optimized Number Classification)

Write an optimized Python program that classifies a number as prime, composite, or neither. Ensure proper input validation and efficient logic.

```
lab-3.1.py > ...  
1  # Write an optimized Python program that classifies a number as prime, composite, or neither.  
2  # Ensure proper input validation and efficient logic.  
3  def classify_number(num):  
4      if num <= 1:  
5          return "Neither"  
6      for i in range(2, int(num**0.5) + 1):  
7          if num % i == 0:  
8              return "Composite"  
9      return "Prime"  
10 num = int(input("Enter a number: "))  
11 print(f"{num} is {classify_number(num)}")
```

Problems Output Debug Console Terminal Ports

PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py  
Enter a number: 5  
5 is Prime  
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py  
Enter a number: 6  
6 is Composite  
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py  
Enter a number: 1  
1 is Neither  
PS C:\Users\danda\OneDrive\Documents\3.2\AIA>

- Define a function called `classify_number` that takes a single argument `num`.

- If num is less than or equal to 1, return "Neither".
- For i in range (2, int(num\*\*0.5) + 1), do the following:
- If num is divisible by i, return "Composite".
- Return "Prime".
- Print the result of the function call.

## Question 5: Zero-Shot Prompting (Perfect Number Check)

### Prompt:

Write a Python function to check whether a given number is a perfect number.

### Code & Output:

```
lab-3.1.py > ...
1  #Write a Python function to check whether a given number is a perfect number
2  def is_perfect_number(num):
3      sum = 0
4      for i in range(1, num):
5          if num % i == 0:
6              sum += i
7      return sum == num
8  num = int(input("Enter a number: "))
9  if is_perfect_number(num):
10     print(f"{num} is a perfect number")
11 else:
12     print(f"{num} is not a perfect number")
...
```

Problems Output Debug Console Terminal Ports

PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py  
Enter a number: 6  
6 is a perfect number  
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py  
Enter a number: 28  
28 is a perfect number  
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py  
Enter a number: 54  
54 is not a perfect number  
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> |

### Explanation:

- Define a function called is\_perfect\_number that takes a single argument num.
- Initialize a variable called sum to 0.
- For i in range (1, num), do the following:

- If num is divisible by i, add i to sum.
- Return True if sum is equal to num, otherwise return False.
- Print the result of the function call.

## Question 6: Few-Shot Prompting (Even or Odd Classification with Validation)

### Prompt:

Write a Python program to classify a number as even or odd with proper validation.

### Code & Output:

```
lab-3.1.py > ...
1  #write a Python program to classify a number as even or odd with proper validation.
2  def classify_number(num):
3      if num % 2 == 0:
4          return "Even"
5      else:
6          return "Odd"
7  num = int(input("Enter a number: "))
8  print(f"{num} is {classify_number(num)}")

Problems Output Debug Console Terminal Ports
powershell + - [ ] [X] ... ^ X
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 8
8 is Even
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> & C:\Users\danda\AppData\Local\Programs\Python\Python313\python.exe
c:/Users/danda/OneDrive/Documents/3.2/AIA/lab-3.1.py
Enter a number: 9
9 is Odd
PS C:\Users\danda\OneDrive\Documents\3.2\AIA> |
```

### Explanation:

- Define a function called `classify_number` that takes a single argument `num`.
- If `num` is divisible by 2, return "Even".
- Else, return "Odd".
- Print the result of the function call.
- Print the number and the result of the function call.