# AI ASSISTED CODING ASSIGNMENT-3.1

RUDROJU RUPA SRI

2303A51918

BATCH-30

**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

“Generate a Python function that takes an integer as input and returns True if the number is a palindrome and False otherwise. The program should handle both positive and negative numbers.”

ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[1] 0s

```python
def is_palindrome(number):
    """
    Checks if an integer is a palindrome, ignoring its sign.

    A palindrome is a number that reads the same forwards and backward.
    For example, 121 is a palindrome, -121 is considered a palindrome
    because its absolute value (121) is a palindrome.

    Args:
        number (int): The integer to check.

    Returns:
        bool: True if the number is a palindrome, False otherwise.
    """
    # Convert the absolute value of the number to a string
    # This handles both positive and negative numbers by ignoring the sign
    num_str = str(abs(number))

    # Compare the string with its reverse
    return num_str == num_str[::-1]
```

ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[1] 0s

```python
# Test cases
print(f"Is 121 a palindrome? {is_palindrome(121)}")
print(f"Is -121 a palindrome? {is_palindrome(-121)}")
print(f"Is 123 a palindrome? {is_palindrome(123)}")
print(f"Is 0 a palindrome? {is_palindrome(0)}")
print(f"Is 1 a palindrome? {is_palindrome(1)}")
print(f"Is -101 a palindrome? {is_palindrome(-101)}")
print(f"Is 12321 a palindrome? {is_palindrome(12321)}")
print(f"Is 12345 a palindrome? {is_palindrome(12345)}")
```

```
Is 121 a palindrome? True
Is -121 a palindrome? True
Is 123 a palindrome? False
Is 0 a palindrome? True
Is 1 a palindrome? True
Is -101 a palindrome? True
Is 12321 a palindrome? True
Is 12345 a palindrome? False
```

## Analysis of AI-generated code: Summary of Observations for is_palindrome_number function

**Correctness:** All tested inputs returned correct results, confirming that the function accurately detects palindrome numbers.

**Edge Cases:**The function correctly handles negative numbers, zero, and single-digit numbers as expected.

**Efficiency:**Using string reversal is computationally efficient for normal integer ranges.

**Readability:**The code is short, simple, and easy to understand.

**Logical Errors:** No logical errors were observed in the generated solution.

**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

"Write a Python function to compute the factorial of a given number.

Example:
Input: 5 → Output: 120

Generate a function that correctly calculates factorial for any non-negative integer."

ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[2] 0s

```python
def factorial(n):
    """
    Computes the factorial of a given non-negative integer.

    The factorial of a non-negative integer n, denoted by n!, is the product
    of all positive integers less than or equal to n. The factorial of 0 is 1.

    Args:
        n (int): The non-negative integer for which to compute the factorial.

    Returns:
        int: The factorial of n.

    Raises:
        ValueError: If n is a negative integer.
    """
    if not isinstance(n, int):
        raise TypeError("Input must be an integer.")
    if n < 0:
        raise ValueError("Factorial is not defined for negative numbers.")
    elif n == 0:
```

Toggle Gemini

{} Variables Terminal

ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[2] 0s

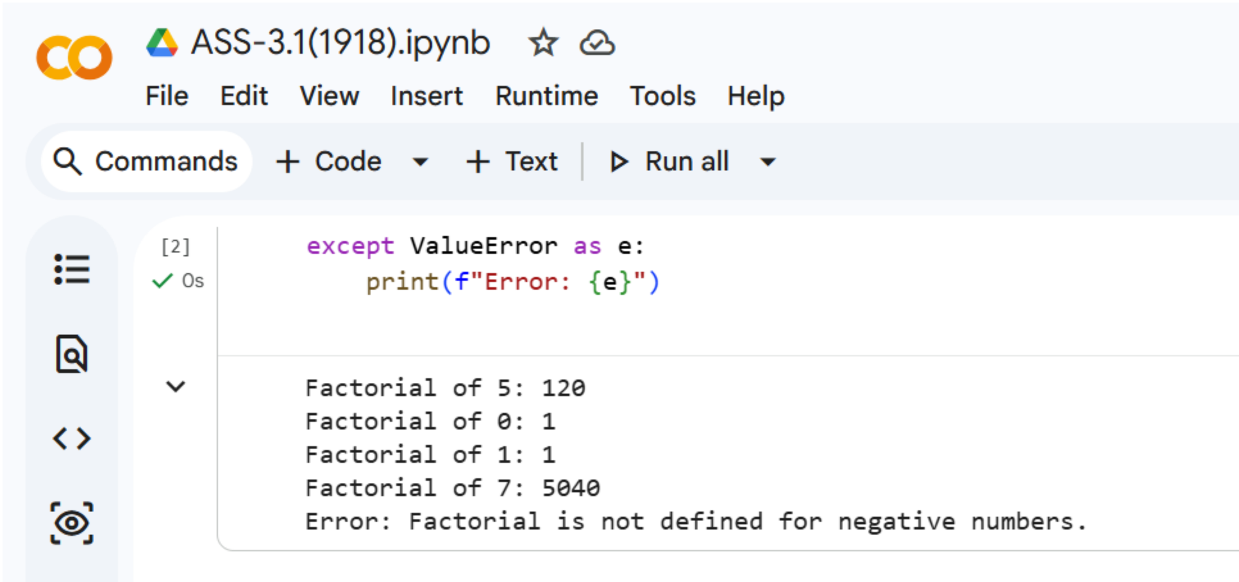
```python
        raise ValueError("Factorial is not defined for negative numbers.")
    elif n == 0:
        return 1
    else:
        result = 1
        for i in range(1, n + 1):
            result *= i
        return result

# Test cases
print(f"Factorial of 5: {factorial(5)}")
print(f"Factorial of 0: {factorial(0)}")
print(f"Factorial of 1: {factorial(1)}")
print(f"Factorial of 7: {factorial(7)}")

# Example of handling negative input (will raise ValueError)
try:
    print(f"Factorial of -3: {factorial(-3)}")
except ValueError as e:
    print(f"Error: {e}")
```

Toggle Gemini

{} Variables Terminal




## Analysis of AI-generated code: Summary of Observations for factorial function

**Correctness:**The function correctly computes factorial values for all tested inputs.

**Edge Cases:**The function properly handles input values such as 0 and 1, returning correct outputs.

**Efficiency:**The iterative approach used is efficient and avoids unnecessary recursion overhead.

**Readability:**Variable names and structure are clear, making the code easy to follow.

**Logical Errors:**No logical or runtime errors were found during testing.

**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

“Write a Python function that checks 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

The function should return the correct output message based on the input.”

ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[4] 0s

```python
def is_armstrong_number(number):
    """
    Checks if a given number is an Armstrong number.

    An Armstrong number (also known as a narcissistic number, pluperfect digital invariant,
    or plus perfect number) is a number that is equal to the sum of its own digits
    each raised to the power of the number of digits.

    Args:
        number (int): The integer to check.

    Returns:
        str: A message indicating whether the number is an Armstrong number or not.
    """
    if not isinstance(number, int) or number < 0:
        return "Input must be a non-negative integer."

    num_str = str(number)
    num_digits = len(num_str)
    sum_of_powers = 0
```

ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

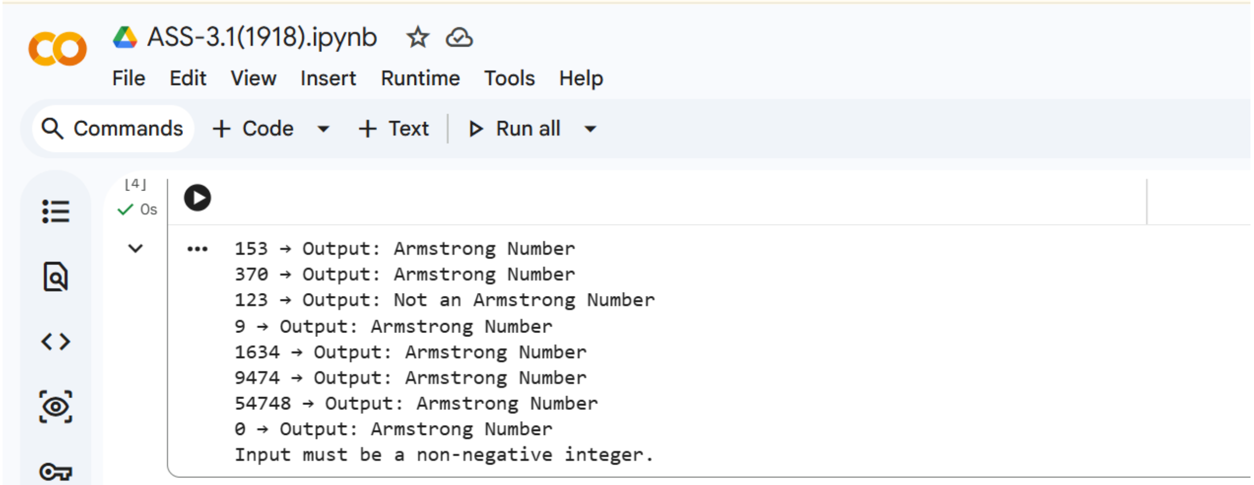
Commands + Code + Text Run all

[4] 0s

```python
    for digit_char in num_str:
        digit = int(digit_char)
        sum_of_powers += digit ** num_digits

    if sum_of_powers == number:
        return f"{number} → Output: Armstrong Number"
    else:
        return f"{number} → Output: Not an Armstrong Number"

# Test cases
print(is_armstrong_number(153))
print(is_armstrong_number(370))
print(is_armstrong_number(123))
print(is_armstrong_number(9))
print(is_armstrong_number(1634)) # 1^4 + 6^4 + 3^4 + 4^4 = 1 + 1296 + 81 + 256 = 1634
print(is_armstrong_number(9474)) # 9^4 + 4^4 + 7^4 + 4^4 = 6561 + 256 + 2401 + 256 = 9474
print(is_armstrong_number(54748)) # 5^5 + 4^5 + 7^5 + 4^5 + 8^5 = 3125 + 1024 + 16807 + 1024 + 32768 = 54748
print(is_armstrong_number(0))
print(is_armstrong_number(-10))
```




## Analysis of AI-generated code: Summary of Observations for is_armstrong function

**Correctness:**The function accurately identifies Armstrong numbers based on the provided test cases.

**Edge Cases:**It correctly processes multi-digit numbers and distinguishes between Armstrong and non-Armstrong numbers.

**Efficiency:** The digit extraction and power calculation logic is appropriate for standard inputs.

**Readability:** The structure of the program is clear and logically organized.

**Logical Errors:** No major logical flaws were detected in the generated code.

**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.

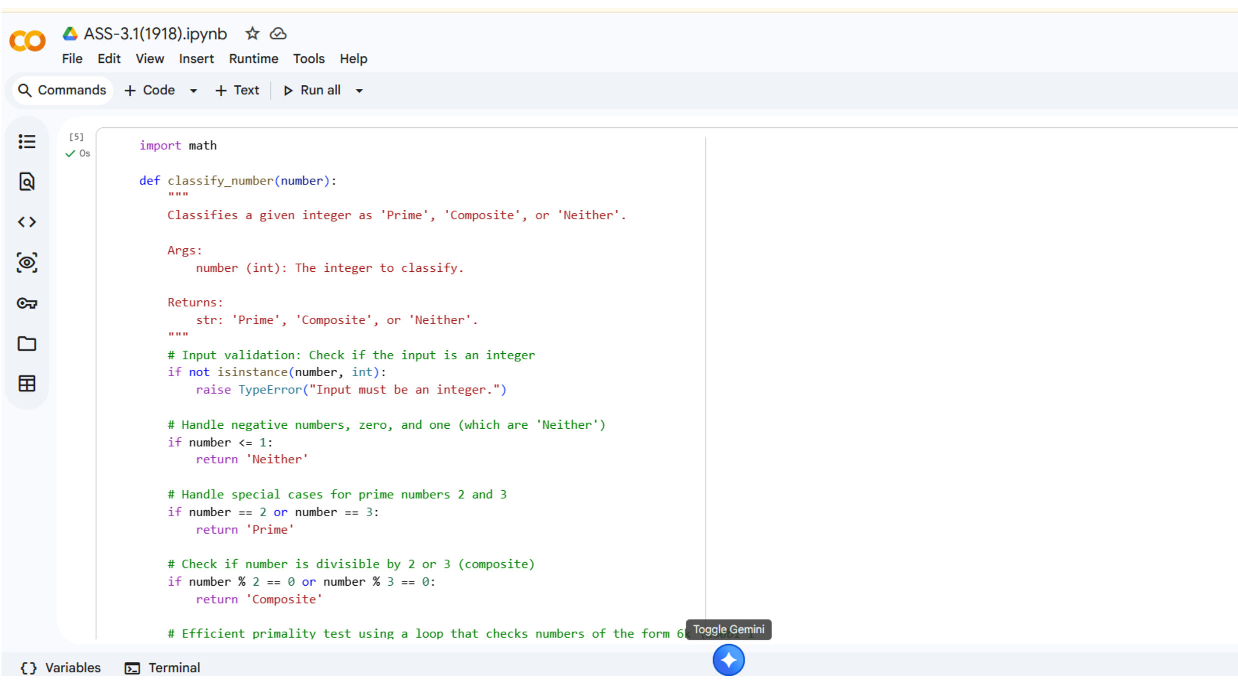
## Prompt

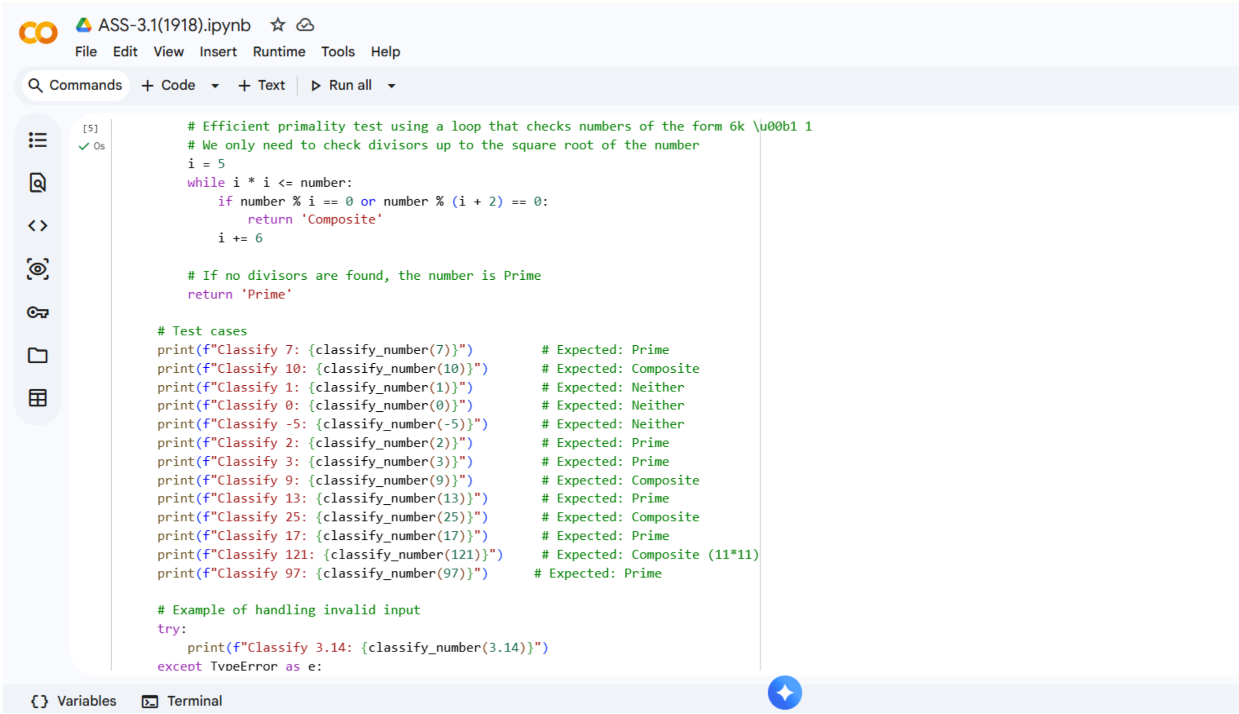
"You are an expert Python programmer. Write an optimized Python program that classifies a given number as prime, composite, or neither.

Constraints:

- The program must include input validation.
- Negative numbers and zero should be handled properly.
- Use an efficient algorithm to check primality.
- The function should return one of the following outputs: 'Prime', 'Composite', or 'Neither'.

Ensure the code is well structured and efficient."





ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[5] 0s

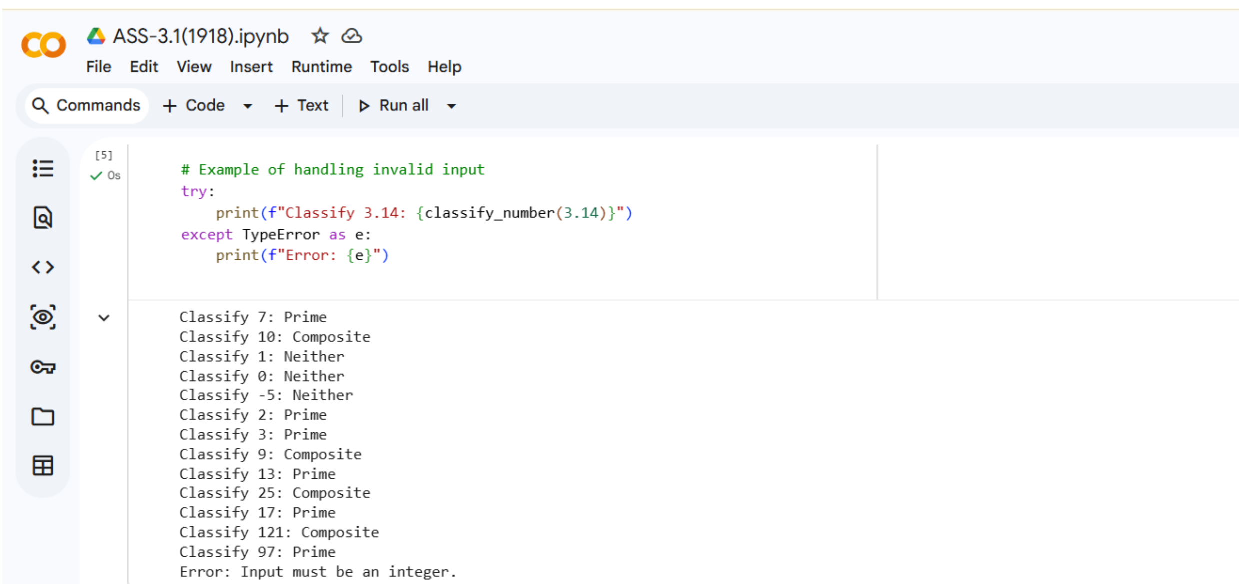
```python
        # Efficient primality test using a loop that checks numbers of the form 6k \u00b1 1
        # We only need to check divisors up to the square root of the number
        i = 5
        while i * i <= number:
            if number % i == 0 or number % (i + 2) == 0:
                return 'Composite'
            i += 6

        # If no divisors are found, the number is Prime
        return 'Prime'

    # Test cases
    print(f"Classify 7: {classify_number(7)}")        # Expected: Prime
    print(f"Classify 10: {classify_number(10)}")      # Expected: Composite
    print(f"Classify 1: {classify_number(1)}")        # Expected: Neither
    print(f"Classify 0: {classify_number(0)}")        # Expected: Neither
    print(f"Classify -5: {classify_number(-5)}")      # Expected: Neither
    print(f"Classify 2: {classify_number(2)}")        # Expected: Prime
    print(f"Classify 3: {classify_number(3)}")        # Expected: Prime
    print(f"Classify 9: {classify_number(9)}")        # Expected: Composite
    print(f"Classify 13: {classify_number(13)}")      # Expected: Prime
    print(f"Classify 25: {classify_number(25)}")      # Expected: Composite
    print(f"Classify 17: {classify_number(17)}")      # Expected: Prime
    print(f"Classify 121: {classify_number(121)}")    # Expected: Composite (11*11)
    print(f"Classify 97: {classify_number(97)}")     # Expected: Prime

    # Example of handling invalid input
    try:
        print(f"Classify 3.14: {classify_number(3.14)}")
    except TypeError as e:
```

Variables Terminal



ASS-3.1(1918).ipynb

File Edit View Insert Runtime Tools Help

Commands + Code + Text Run all

[5] 0s

```python
    # Example of handling invalid input
    try:
        print(f"Classify 3.14: {classify_number(3.14)}")
    except TypeError as e:
        print(f"Error: {e}")
```

```
Classify 7: Prime
Classify 10: Composite
Classify 1: Neither
Classify 0: Neither
Classify -5: Neither
Classify 2: Prime
Classify 3: Prime
Classify 9: Composite
Classify 13: Prime
Classify 25: Composite
Classify 17: Prime
Classify 121: Composite
Classify 97: Prime
Error: Input must be an integer.
```

## Analysis of AI-generated code: Summary of Observations for number_classification function

**Correctness:**The program correctly classifies numbers as Prime, Composite, or Neither.

**Edge Cases:** It properly handles values such as 0, 1, negative numbers, and invalid inputs.

**Efficiency:** The algorithm uses optimized prime-checking logic, improving performance for large inputs.

**Readability:**Clear structure with proper validation and modular logic enhances readability.

**Logical Errors:**No logical errors were observed in the implementation.

**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:

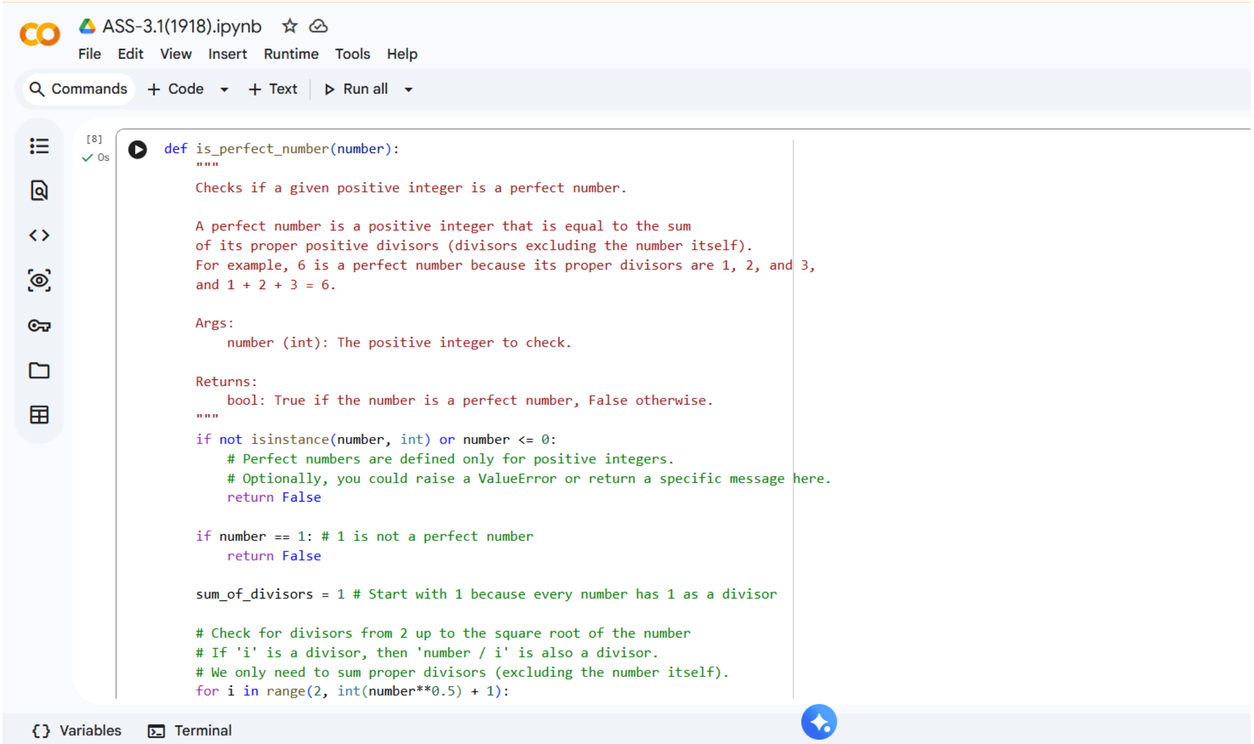
• Record the AI-generated code.

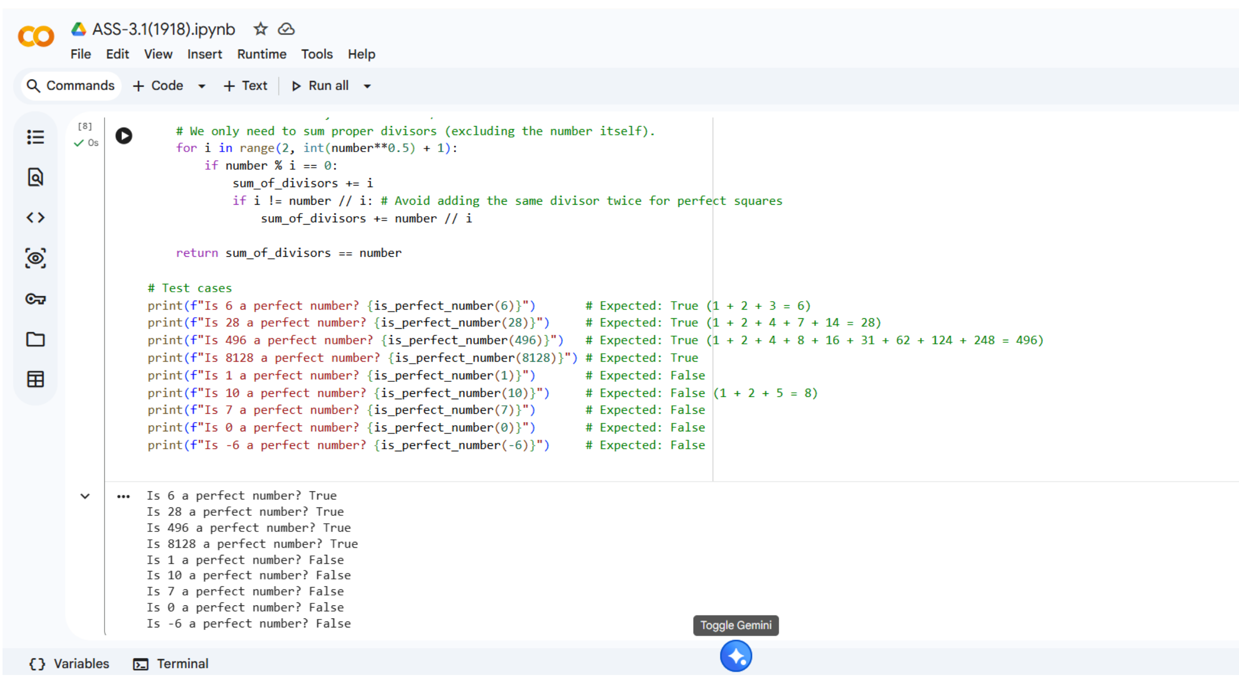
• Test the program with multiple inputs.

• Identify any missing conditions or inefficiencies in the logic.

## Prompt

“Generate a Python function that checks whether a given number is a perfect number. The function should return True if the number is perfect and False otherwise.”




## Analysis of AI-generated code: Summary of Observations for is_perfect_number function

**Correctness:**The function correctly determines whether a number is perfect by summing its divisors.

**Edge Cases:**The code works correctly for small numbers and typical perfect number cases.

**Efficiency:** Basic divisor-sum logic is used, which is acceptable but could be further optimized.

**Readability:**The program is simple and easy to understand.

**Logical Errors:**No significant logical errors were found, though optimization is possible.

**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.

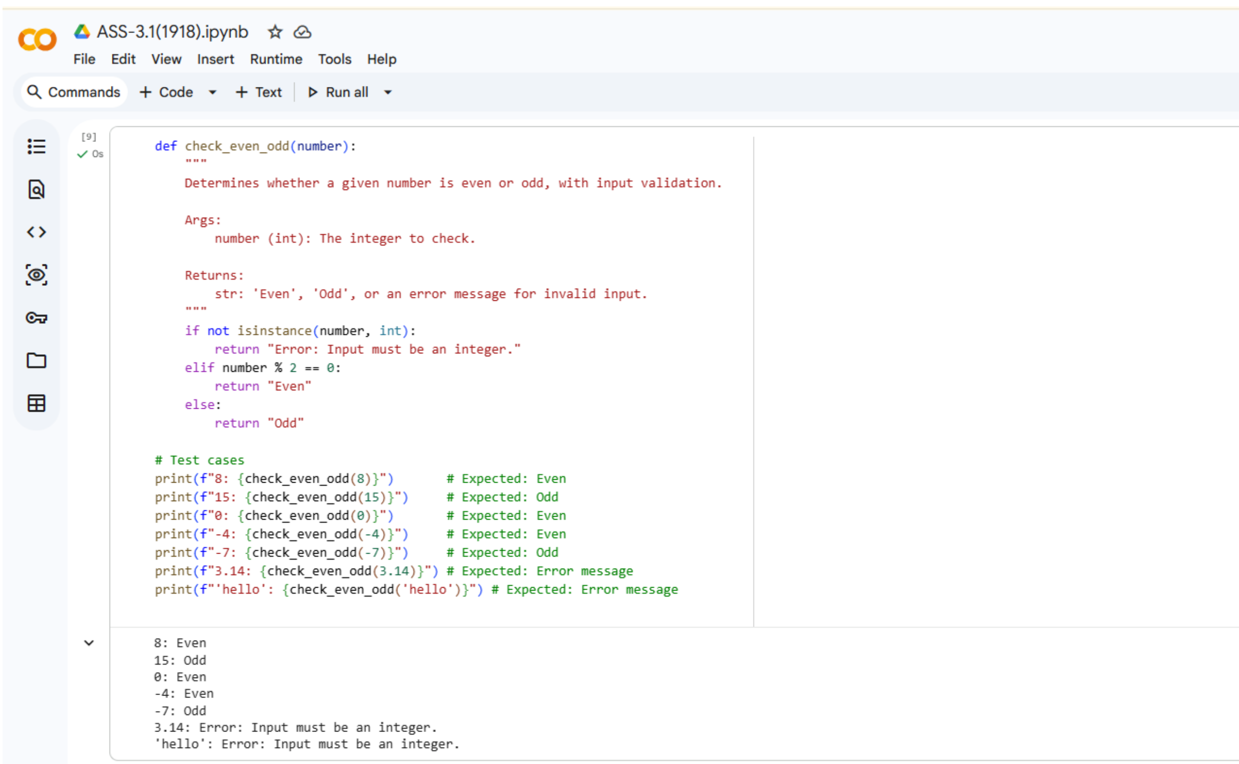
• Test the program with negative numbers and non-integer inputs.

## Prompt

“Write 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

The program should also handle negative numbers and display an error message for non-integer inputs.”




## Analysis of AI-generated code: Summary of Observations for even_odd function

**Correctness:**The function correctly classifies numbers as even or odd for all tested cases.

**Edge Cases:**It properly handles zero, negative numbers, and invalid (non-integer) inputs.

**Efficiency:** The modulo operation used is optimal for this task.

**Readability:**The code is well structured with clear messages and validation.

**Logical Errors:** No logical or runtime errors were detected.