# AI-Assisted Coding

## Assignment-3.5

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Batch:45

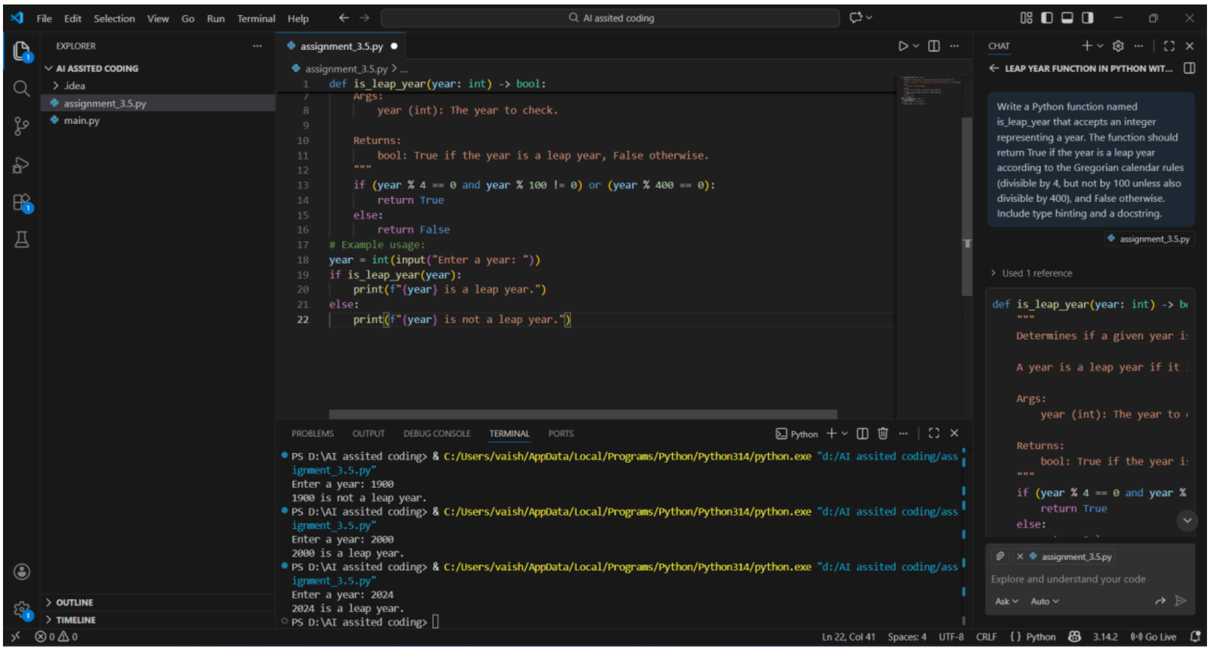
Question 1: Zero-Shot Prompting (Leap Year Check)

Write a zero-shot prompt to generate a Python function that checks

whether a given year is a leap year.

Task:

- Record the AI-generated code.
- Test with years like 1900, 2000, 2024.
- Identify logical flaws or missing conditions.



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assignment_3.5.py

```python
def is_leap_year(year: int) -> bool:
    Args:
        year (int): The year to check.

    Returns:
        bool: True if the year is a leap year, False otherwise.
    """
    if (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0):
        return True
    else:
        return False
# Example usage:
year = int(input("Enter a year: "))
if is_leap_year(year):
    print(f"{year} is a leap year.")
else:
    print(f"{year} is not a leap year.")
```

```
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a year: 1900
1900 is not a leap year.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a year: 2000
2000 is a leap year.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a year: 2024
2024 is a leap year.
PS D:\AI assited coding> 
```

Write a Python function named is_leap_year that accepts an integer representing a year. The function should return True if the year is a leap year according to the Gregorian calendar rules (divisible by 4, but not by 100 unless also divisible by 400), and False otherwise. Include type hinting and a docstring.

```python
def is_leap_year(year: int) -> b
    """
    Determines if a given year i

    A year is a leap year if it 

    Args:
        year (int): The year to 

    Returns:
        bool: True if the year i
    """
    if (year % 4 == 0 and year %
        return True
    else:
```

## Question 2: One-Shot Prompting (GCD of Two Numbers)

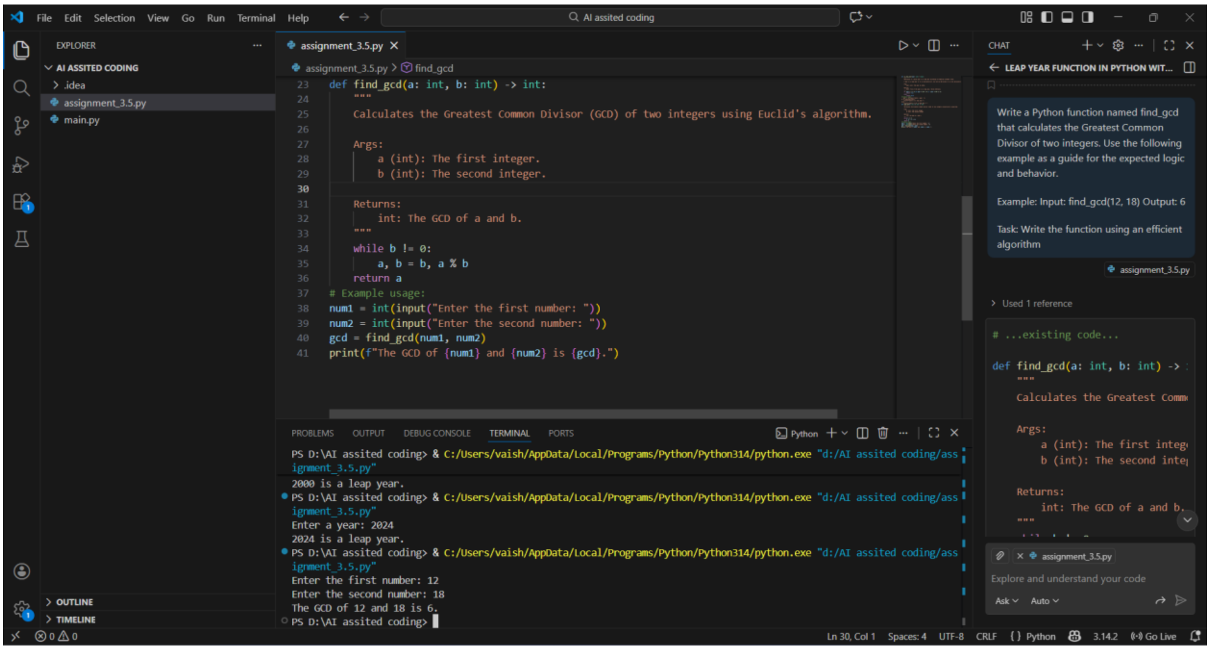
Write a one-shot prompt with one example to generate a Python function that finds the Greatest Common Divisor (GCD) of two numbers.

Example:

Input: 12, 18 → Output: 6

Task:

- Compare with a zero-shot solution.
- Analyze algorithm efficiency



```python
def find_gcd(a: int, b: int) -> int:
    """
    Calculates the Greatest Common Divisor (GCD) of two integers using Euclid's algorithm.

    Args:
        a (int): The first integer.
        b (int): The second integer.

    Returns:
        int: The GCD of a and b.
    """
    while b != 0:
        a, b = b, a % b
    return a
# Example usage:
num1 = int(input("Enter the first number: "))
num2 = int(input("Enter the second number: "))
gcd = find_gcd(num1, num2)
print(f"The GCD of {num1} and {num2} is {gcd}.")
```

```
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
2000 is a leap year.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a year: 2024
2024 is a leap year.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter the first number: 12
Enter the second number: 18
The GCD of 12 and 18 is 6.
PS D:\AI assited coding>
```

Write a Python function named find_gcd that calculates the Greatest Common Divisor of two integers. Use the following example as a guide for the expected logic and behavior.

Example: Input: find_gcd(12, 18) Output: 6

Task: Write the function using an efficient algorithm

assignment_3.5.py

```python
# ...existing code...

def find_gcd(a: int, b: int) ->
    """
    Calculates the Greatest Comm

    Args:
        a (int): The first integ
        b (int): The second inte

    Returns:
        int: The GCD of a and b.
    """
```

Question 3: Few-Shot Prompting (LCM Calculation)

Write a few-shot prompt with multiple examples to generate a Python

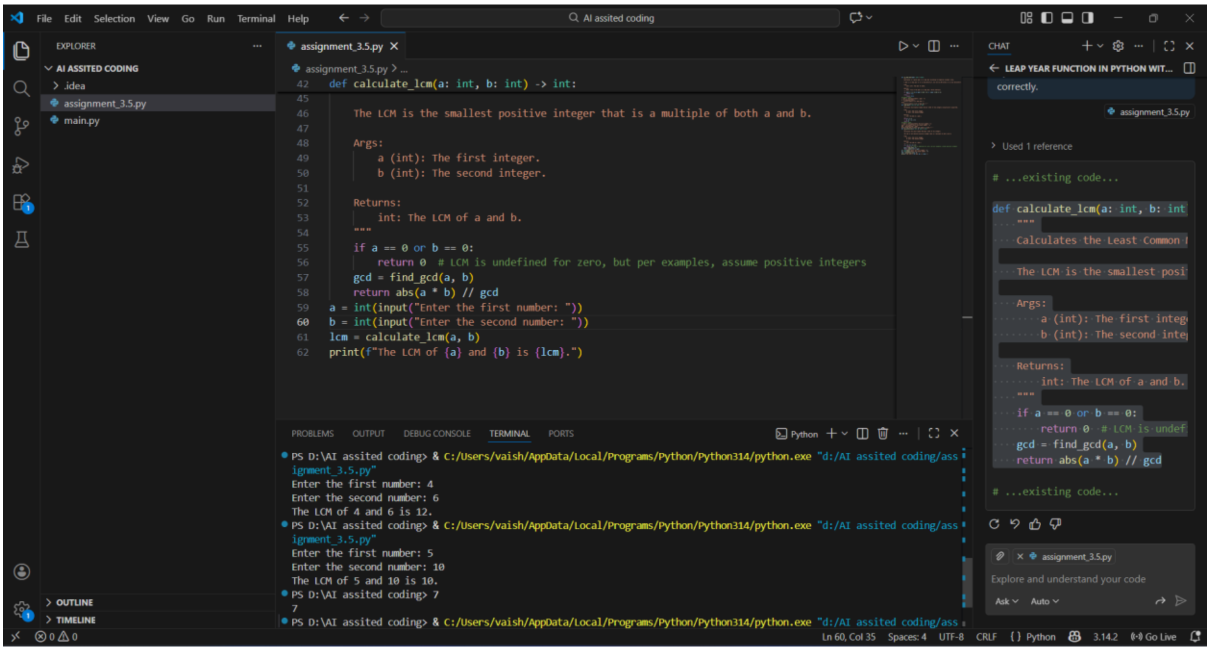
function that computes the Least Common Multiple (LCM).

Examples:

- Input: 4, 6 → Output: 12
- Input: 5, 10 → Output: 10
- Input: 7, 3 → Output: 21

Task:

- Examine how examples guide formula selection.
- Test edge cases



```python
def calculate_lcm(a: int, b: int) -> int:

    The LCM is the smallest positive integer that is a multiple of both a and b.

    Args:
        a (int): The first integer.
        b (int): The second integer.

    Returns:
        int: The LCM of a and b.
    """
    if a == 0 or b == 0:
        return 0  # LCM is undefined for zero, but per examples, assume positive integers
    gcd = find_gcd(a, b)
    return abs(a * b) // gcd
a = int(input("Enter the first number: "))
b = int(input("Enter the second number: "))
lcm = calculate_lcm(a, b)
print(f"The LCM of {a} and {b} is {lcm}.")
```

```
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter the first number: 4
Enter the second number: 6
The LCM of 4 and 6 is 12.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter the first number: 5
Enter the second number: 10
The LCM of 5 and 10 is 10.
PS D:\AI assited coding> 7
7
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
```

```python
# ...existing code...

def calculate_lcm(a: int, b: int
    """
    Calculates the Least Common

    The LCM is the smallest posi

    Args:
        a (int): The first integ
        b (int): The second inte

    Returns:
        int: The LCM of a and b.
    """
    if a == 0 or b == 0:
        return 0  # LCM is undef
    gcd = find_gcd(a, b)
    return abs(a * b) // gcd

# ...existing code...
```

Question 5: One-Shot Prompting (Decimal to Binary Conversion)

Write a one-shot prompt with an example to generate a Python function

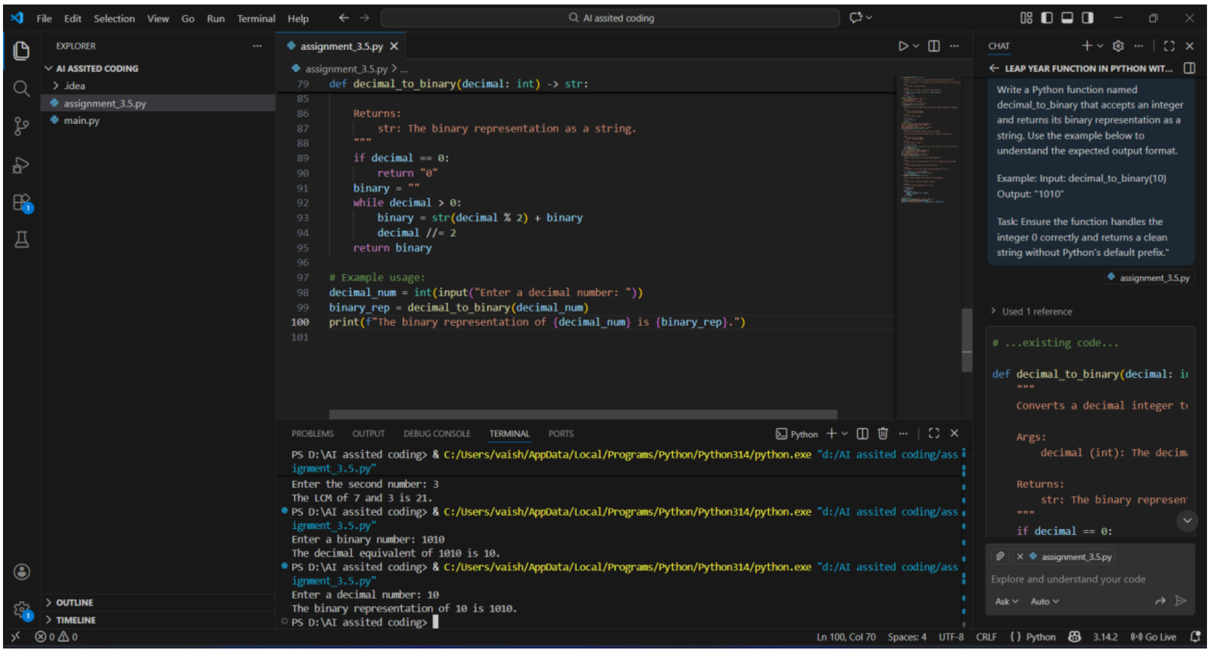
that converts a decimal number to binary.

Example:

Input: 10 → Output: 1010

Task:

- Compare clarity with zero-shot output.
- Analyze handling of zero and negative numbers.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Used 1 reference
Explore and understand your code
Ask Auto
Ln 100, Col 70 Spaces: 4 UTF-8 CRLF {} Python 3.14.2 Go Live

```python
def decimal_to_binary(decimal: int) -> str:

    Returns:
        str: The binary representation as a string.
    """
    if decimal == 0:
        return "0"
    binary = ""
    while decimal > 0:
        binary = str(decimal % 2) + binary
        decimal //= 2
    return binary

# Example usage:
decimal_num = int(input("Enter a decimal number: "))
binary_rep = decimal_to_binary(decimal_num)
print(f"The binary representation of {decimal_num} is {binary_rep}.")
```

```
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter the second number: 3
The LCM of 7 and 3 is 21.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a binary number: 1010
The decimal equivalent of 1010 is 10.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a decimal number: 10
The binary representation of 10 is 1010.
PS D:\AI assited coding>
```

Write a Python function named decimal_to_binary that accepts an integer and returns its binary representation as a string. Use the example below to understand the expected output format.

Example: Input: decimal_to_binary(10)
Output: "1010"

Task: Ensure the function handles the integer 0 correctly and returns a clean string without Python's default prefix."

assignment_3.5.py

```python
# ...existing code...

def decimal_to_binary(decimal: i
    """
    Converts a decimal integer t

    Args:
        decimal (int): The decim

    Returns:
        str: The binary represen
    """
    if decimal == 0:
```

Question 6: Few-Shot Prompting (Harshad Number Check)

Write a few-shot prompt to generate a Python function that checks

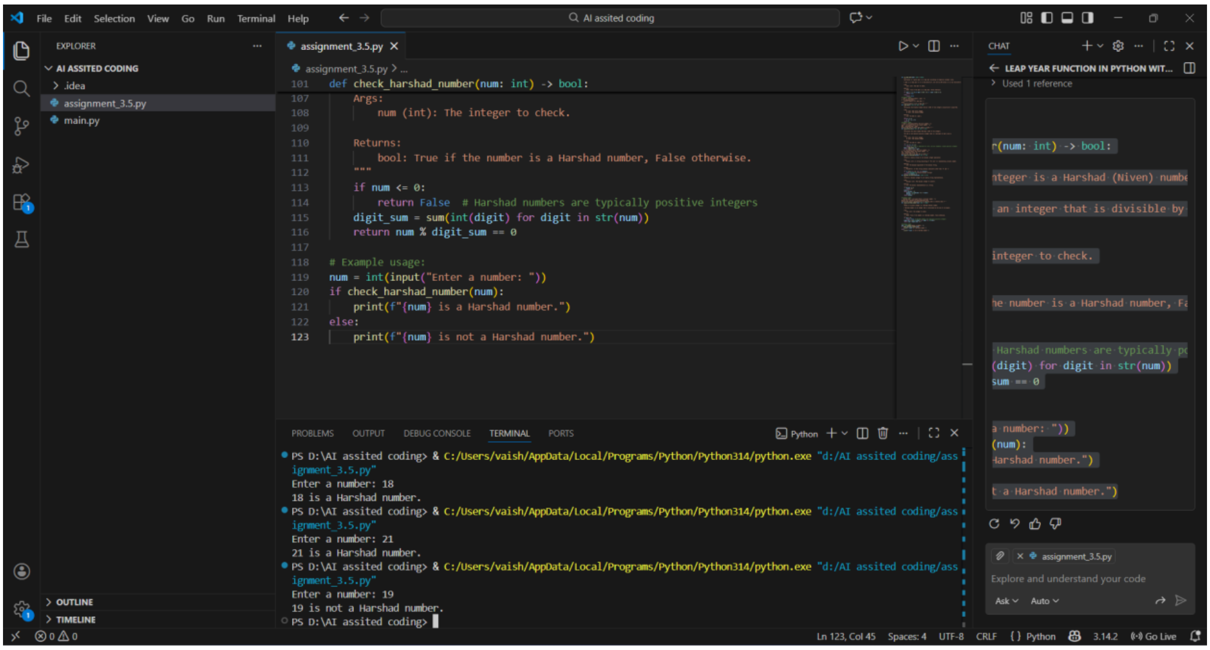
whether a number is a Harshad (Niven) number.

Examples:

- Input: 18 → Output: Harshad Number
- Input: 21 → Output: Harshad Number
- Input: 19 → Output: Not a Harshad Number

Task:

- Test boundary conditions.
- Evaluate robustness



```python
def check_harshad_number(num: int) -> bool:
    Args:
        num (int): The integer to check.

    Returns:
        bool: True if the number is a Harshad number, False otherwise.
    """
    if num <= 0:
        return False  # Harshad numbers are typically positive integers
    digit_sum = sum(int(digit) for digit in str(num))
    return num % digit_sum == 0

# Example usage:
num = int(input("Enter a number: "))
if check_harshad_number(num):
    print(f"{num} is a Harshad number.")
else:
    print(f"{num} is not a Harshad number.")
```

```
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a number: 18
18 is a Harshad number.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a number: 21
21 is a Harshad number.
PS D:\AI assited coding> & C:/Users/vaish/AppData/Local/Programs/Python/Python314/python.exe "d:/AI assited coding/ass
ignment_3.5.py"
Enter a number: 19
19 is not a Harshad number.
PS D:\AI assited coding> 
```