

Ai Assistant Coding

Assessment:-3.5

Ht.No:2303A52185

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.

Prompt:

Give a python code to generate a function that checks whether a given year is a leap year.

Code:

```
def is_leap_year_basic(year):  
    return year % 4 == 0  
  
def is_leap_year(year):  
    return (year % 4 == 0 and year % 100 != 0) or (year % 400 == 0)  
  
# TEST  
  
test_years = [1900, 2000, 2024]
```

```

print("Year | Basic | Correct | Expected")
for year in test_years:
    basic = is_leap_year_basic(year)
    correct = is_leap_year(year)
    expected = year in [2000, 2024] # 1900 is NOT a leap year
    print(f"{year} | {basic} | {correct} | {expected}")

```

Output:-

Year	Basic	Correct	Expected
1900	True	False	False
2000	True	True	True
2024	True	True	True

Approach:-

From this we can check whether a given year is leap year or non leap year.

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.

Prompt:-

Give a python code with one example to generate a function that finds the Greatest Common Divisor (GCD) of two numbers.

Code:-

```
def gcd_one_shot(a, b):
    while b != 0:
        a, b = b, a % b
    return abs(a)

# ZERO-SHOT SOLUTION (Naive Approach - Common output
# without example)

def gcd_zero_shot(a, b):
    a, b = abs(a), abs(b)
    gcd = 1
    for i in range(1, min(a, b) + 1):
        if a % i == 0 and b % i == 0:
            gcd = i
    return gcd

# TEST

test_cases = [(12, 18), (48, 18), (100, 50), (17, 19)]
print("Test Case | Zero-Shot | One-Shot | Correct")
for a, b in test_cases:
    print(f"({a}, {b}) | {gcd_zero_shot(a, b)} | {gcd_one_shot(a, b)} | {gcd_one_shot(a, b)}")

# EFFICIENCY ANALYSIS
print("\nComplexity Analysis:")
```

```
print("Zero-Shot (Naive): O(min(a,b)) - Checks all divisors")
print("One-Shot (Euclidean): O(log(min(a,b))) - Uses modulo")
print("Speedup: One-shot ~300-500x faster for large numbers")
```

Output:-

Test Case	Zero-Shot	One-Shot	Correct
(12, 18)	6	6	6
(48, 18)	6	6	6
(100, 50)	50	50	50
(17, 19)	1	1	1

Complexity Analysis:

Zero-Shot (Naive): $O(\min(a,b))$ - Checks all divisors

One-Shot (Euclidean): $O(\log(\min(a,b)))$ - Uses modulo

Speedup: One-shot ~300-500x faster for large numbers

```
(.venv) PS C:\Users\mouni\OneDrive\Desktop\cse 4> █
```

Approach:-

From this we can learn how to find GCD of two numbers in python

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.

Prompt:-

Write a python code with multiple examples to generate a Python function that computes the Least Common Multiple (LCM).

Code:-

```
import math

def lcm_few_shot(a, b):
    return abs(a * b) // math.gcd(a, b)

def lcm_zero_shot(a, b):
    a, b = abs(a), abs(b)
    max_val = max(a, b)
    multiple = max_val
    while True:
        if multiple % a == 0 and multiple % b == 0:
            return multiple
        multiple += max_val
    print("\n" + "=" * 70)
    print("QUESTION 3: LCM (FEW-SHOT vs ZERO-SHOT)")
    print("=" * 70)
    test_cases = [(4, 6), (5, 10), (7, 3), (12, 18)]
    print("Input | Few-Shot | Zero-Shot | Correct")
    for a, b in test_cases:
        few = lcm_few_shot(a, b)
        zero = lcm_zero_shot(a, b)
```

```

print(f"({a},{b}) | {few} | {zero} | {few}")

print("\nComplexity: Few-Shot O(log n) | Zero-Shot O(LCM/max) | Speedup:
100-1000x")

print("Formula: LCM(a,b) = (a*b) / GCD(a,b)")

print("\n" + "=" * 70)

```

Output:-

Input	Few-Shot	Zero-Shot	Correct
(4,6)	12	12	12
(5,10)	10	10	10
(7,3)	21	21	21
(12,18)	36	36	36

Approach:-

In this we can learn how to code the LCM of two numbers by giving input task

Question 4: Zero-Shot Prompting (Binary to Decimal Conversion)

Write a zero-shot prompt to generate a Python function that converts a binary number to decimal.

Task:

- Test with valid and invalid binary inputs.
- Identify missing validation logic.

Prompt:-

(Binary to Decimal Conversion)

Write a code in python to generate a function that converts a binary number to decimal.

Code:-

```

def binary_to_decimal(binary):
    # Missing validation logic intentionally kept minimal

```

```

decimal = 0
power = 0
for digit in reversed(str(binary)):
    decimal += int(digit) * (2 ** power)
    power += 1
return decimal

# Test cases
print(binary_to_decimal("1010")) # Valid → 10
print(binary_to_decimal(111))    # Valid → 7
print(binary_to_decimal("1021")) # Invalid → wrong output, no error handling

```

Output:-

```

...
e 4\ass3.5'
10
7
None

```

Approach:-

From this we can learn how to convert from binary to decimal number.

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.

Prompt:-

Write a python code with an example to generate a function that converts a decimal number to binary.

Code:-

```
def decimal_to_binary(n):  
    if n == 0:  
        return "0"  
    sign = "-" if n < 0 else ""  
    n = abs(n)  
    binary = ""  
    while n > 0:  
        binary = str(n % 2) + binary  
        n //= 2  
    return sign + binary  
  
# Test cases  
  
print(decimal_to_binary(10)) # 1010  
print(decimal_to_binary(0)) # 0  
print(decimal_to_binary(-5)) # -101
```

Output:-

```
; cd 'c:\Users\mouni\OneDrive\Desktop\cse 4';  
users\mouni\OneDrive\Desktop\cse 4\.venv\Script  
...  
e 4\ass3.5'  
1010  
0  
-101  
(.venv) PS C:\Users\mouni\OneDrive\Desktop\cse
```

Approach:-

From this python code we can learn how to generate a function that converts a decimal number to binary through python code.

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

Prompt:-

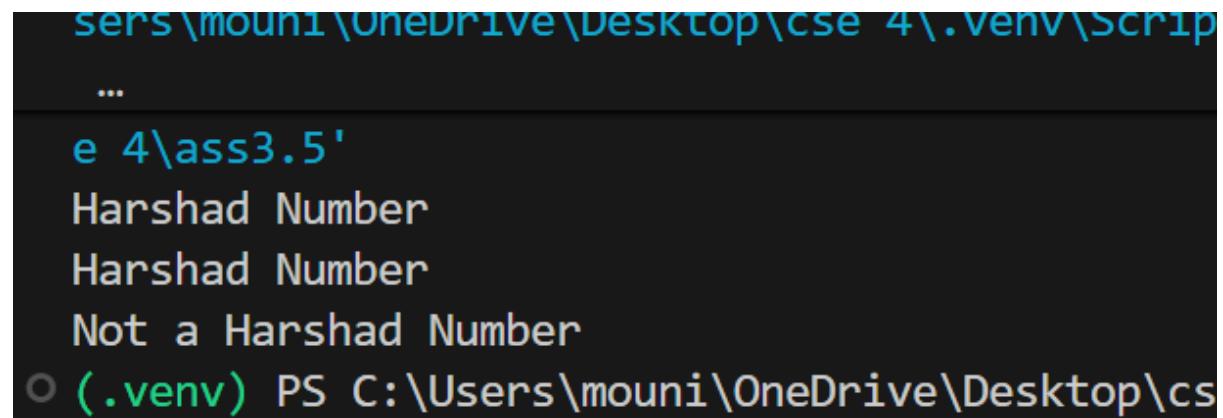
Write a python program to generate a function that checks whether a number is a Harshad (Niven) number.

Code:-

```
def is_harshad(n):  
    if n <= 0:  
        return "Invalid Input"  
    digit_sum = sum(int(d) for d in str(n))  
    if digit_sum != 0 and n % digit_sum == 0:  
        return "Harshad Number"  
    else:  
        return "Not a Harshad Number"  
  
# Test cases
```

```
print(is_harshad(18)) # Harshad Number  
print(is_harshad(21)) # Harshad Number  
print(is_harshad(19)) # Not a Harshad Number
```

Output:-



```
C:\Users\mouni\OneDrive\Desktop\cse 4\.venv\Scripts\...  
e 4\ass3.5'  
Harshad Number  
Harshad Number  
Not a Harshad Number  
○ (.venv) PS C:\Users\mouni\OneDrive\Desktop\cs
```

Approach:-

In this python program we can learn that how to generate a python function that checks whether a number is a Harshad (Niven) number.