

# AI ASSISTED CODING

## ASSIGNMENT-3.5

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### 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.

Week2 -

Task:

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

**Prompt:**

**# write a function to check leap year**

**Code:**

```
C: > Users > matta > OneDrive > Desktop > AI Assisted Coding > Untitled-1.py > is_leap.py
1 def is_leap_year(year: int) -> bool:
2     if year % 400 == 0:
3         return True
4     if year % 100 == 0:
5         return False
6     return year % 4 == 0
7 print(is_leap_year(1900))
8 print(is_leap_year(2000))
9 print(is_leap_year(2024))
```

**Output:**

```
top/AI Assisted Coding/Untitled-1.py"
False
True
True
```

**Justification:**

This is a zero-shot prompt because no examples were provided. The generated logic is correct and handles all leap year rules. No logical flaws found.

## 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:**

**One-Shot:**

**# if the input is 12,18 output will be 6 write a function**

**Code:**

```
11 def gcd(a: int, b: int) -> int:
12     while b != 0:
13         a, b = b, a % b
14     return abs(a)
15 print(gcd(12,18))
16 print(gcd(100,75))
17
```

**Output:**

```
top/AI Assisted Coding/Untitled-1.py"
6
25
```

**Zero Shot Prompt:**

**#write a function for gcd of two numbers**

**Code:**

```

59
60 def gcd(a: int, b: int) -> int:
61     a, b = abs(a), abs(b)
62     while b != 0:
63         a, b = b, a % b
64     return a
65 print(gcd(12, 18))
66 print(gcd(5,100))
67

```

### Output:

```

top/AI Assisted Coding/Untitled-1.py"
6
5

```

### Justification:

Providing one example improves clarity and efficiency. The algorithm runs in  $O(\log n)$  time, which is optimal.

### 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:

# if the input is 4,6 output is 12 , input is 5,10 output is 10, input is 7,3 output is 21 write a function

### Code:

```

17
18 def lcm(a: int, b: int) -> int:
19     if a == 0 or b == 0:
20         return 0 # LCM with 0 is usually taken as 0
21     # Using relationship: lcm(a, b) * gcd(a, b) = |a * b|
22     def gcd(x: int, y: int) -> int:
23         while y:
24             x, y = y, x % y
25         return x
26
27     return abs(a * b) // gcd(a, b)
28 print(lcm(4,6))
29 print(lcm(5,10))
30 print(lcm(7,21))
31

```

### Output:

```

C:\Programs\Python\Python312\python.exe C:/Users/mateu/Desktop/Desktop/Top/AI Assisted Coding/Untitled-1.py"
12
10
21

```

### Justification:

Multiple examples guide the model to use the  $\text{LCM} = (a \times b) / \text{GCD}$  formula. Few-shot prompting improves correctness and formula selection.

### 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:

**# write a function to convert binary number to decimal number**

### Code:

```

31
32 def binary_to_decimal(binary_str: str) -> int:
33     decimal = 0
34     for digit in binary_str:
35         decimal = decimal * 2 + int(digit)
36     return decimal
37 print(binary_to_decimal("1010"))
38

```

### Output:

```
top/AI Assisted Coding/Untitled-1.py"
10
```

### Justification:

Zero-shot output is concise but lacks **input validation**, which reduces robustness.

### 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:

# input is 10 and output is 1010 write a function

### Code:

```
38
39 def decimal_to_binary(n: int) -> str:
40     if n == 0:
41         return "0"
42     bits = ""
43     while n > 0:
44         bits = str(n % 2) + bits
45         n //= 2
46     return bits
47 print(decimal_to_binary(10))
48
```

### Output:

```
top/AI Assisted Coding/Untitled-1.py"
1010
```

### Justification:

One example improves clarity compared to zero-shot. Negative numbers are not handled explicitly, which is a limitation.

### 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:**

**# input is 18 then output Harshad Number, input is 21 output Harshad Number  
write a code**

**Code:**

```
49 def check_harshad_number(n: int):
50     digit_sum = sum(int(digit) for digit in str(n))
51     if digit_sum != 0 and n % digit_sum == 0:
52         print("Harshad Number")
53     else:
54         print("Not a Harshad Number")
55 check_harshad_number(18)
56 check_harshad_number(21)
57 check_harshad_number(19)
58
```

**Output:**

```
top/AI Assisted Coding/Untitled-1.py
Harshad Number
Harshad Number
Not a Harshad Number
```

**Justification:**

Few-shot examples clearly define the rule. Edge case for 0 is missing, slightly reducing robustness.