

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.

Task:

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

```
C: > Users > gudah > OneDrive > Documents > AIAC > Lab_assignment_3.5.py > ...
1 #Generate a python function that reads year and checks if it is leap year or not.
2 def is_leap_year(year):
3     if year % 4 == 0:
4         if year % 100 == 0:
5             if year % 400 == 0:
6                 return True
7             else:
8                 return False
9         else:
10            return True
11    else:
12        return False
13    try:
14        year = int(input("Enter a year: "))
15        if year < 0:
16            print("Invalid year")
17        else:
18            if is_leap_year(year):
19                print(f"{year} is a leap year")
20            else:
21                print(f"{year} is not a leap year")
22    except ValueError:
23        print("Invalid input")
```

```
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```

- 1.The leap year logic is correct but unnecessarily complex due to deep nesting.
- 2.Checking for negative years is not meaningful for the standard calendar.
- 3.Year 0 is not handled even though it is not a valid year.
- 4.A simpler condition can replace multiple if-else statements.
- 5.Mixing input handling with logic reduces reusability of the function.

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.

One-shot

```
C: > Users > gudah > OneDrive > Documents > AIAC > Lab_assignment_3.5.py > ...
26 '''
27     nums=12,18
28     display 6
29 '''
30 def gcd(a, b):
31     while b:
32         a, b = b, a % b
33     return a
34 try:
35     num1 = int(input("Enter first number: "))
36     num2 = int(input("Enter second number: "))
37     if num1 <= 0 or num2 <= 0:
38         print("Invalid input")
39     else:
40         result = gcd(num1, num2)
41         print(f"GCD of {num1} and {num2} is {result}")
42 except ValueError:
43     print("Invalid input")
```

PROBLEMS OUTPUT DEBUG CONSOLE **TERMINAL** PORTS

```
Enter first number: 12
Enter second number: 18
GCD of 12 and 18 is 6
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 6
Enter second number: 7
GCD of 6 and 7 is 1
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 0
Enter second number: 0
Invalid input
```

Zero shot

```
45 #Generate a python code that reads two numbers and displays GCD of the numbers
46 n1=int(input("Enter first number: "))
47 n2=int(input("Enter second number: "))
48 try:
49     while n2:
50         n1, n2 = n2, n1 % n2
51         print("GCD is:",n1)
52 except ValueError:
53     print("Invalid input")
54
```

PROBLEMS OUTPUT DEBUG CONSOLE **TERMINAL** PORTS

```
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 12
Enter second number: 18
GCD is: 6
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 0
Enter second number: 0
GCD is: 0
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 2
Enter second number: 9
GCD is: 1
```

Efficiency comparison of the two GCD codes:

- Both programs use the **Euclidean Algorithm**, so their **time complexity is the same: $O(\log \min(a, b))$** .
- The **One shot code is slightly more efficient in structure** because the GCD logic is placed inside a function, making it reusable and cleaner.
- The **Zero shot code mixes input, logic, and output**, which reduces maintainability but does not change algorithmic efficiency.
- The try–except in the Zero shot code is unnecessary because `int(input())` errors occur **before** the loop runs.
- Overall, **performance is equal**, but the **One shot code is better in design and clarity**, making it preferable in practice.

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.

```

57     '''
58     nums=4 6
59     display 12
60     nums=5 10
61     display 10
62     nums=7 3
63     display 21
64     '''
65     def lcm(a, b):
66         def gcd(x, y):
67             while y:
68                 x, y = y, x % y
69             return x
70         return abs(a * b) // gcd(a, b)
71     try:
72         num1 = int(input("Enter first number: "))
73         num2 = int(input("Enter second number: "))
74         if num1 <= 0 or num2 <= 0:
75             print("Invalid input")
76         else:
77             result = lcm(num1, num2)
78             print(f"LCM of {num1} and {num2} is {result}")
79     except ValueError:
80         print("Invalid input")

```

```

65 def lcm(a, b):
66     def gcd(x, y):
67         while y:
68             x, y = y, x % y
69         return x
70     return abs(a * b) // gcd(a, b)
71 try:
72     num1 = int(input("Enter first number: "))
73     num2 = int(input("Enter second number: "))
74     if num1 <= 0 or num2 <= 0:
75         print("Invalid input")
76     else:
77         result = lcm(num1, num2)
78         print(f"LCM of {num1} and {num2} is {result}")
79 except ValueError:
80     print("Invalid input")

```

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS
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```

PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 4
Enter second number: 6
LCM of 4 and 6 is 12
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 5
Enter second number: 10
LCM of 5 and 10 is 10
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 7
Enter second number: 3
LCM of 7 and 3 is 21
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter first number: 0
Enter second number: 0
Invalid input

```

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.

```
82 #Generate a python function that reads a binary number and converts it to decimal number
83 def binary_to_decimal(binary_str):
84     decimal_num = 0
85     binary_str = binary_str[::-1]
86     for index, digit in enumerate(binary_str):
87         if digit == '1':
88             decimal_num += 2 ** index
89     return decimal_num
90 try:
91     binary_input = input("Enter a binary number: ")
92     if not all(char in '01' for char in binary_input):
93         print("Invalid binary number")
94     else:
95         decimal_output = binary_to_decimal(binary_input)
96         print(f"Decimal equivalent of binary {binary_input} is {decimal_output}")
97 except ValueError:
98     print("Invalid input")
```

```
82 #Generate a python function that reads a binary number and converts it to decimal number
83 def binary_to_decimal(binary_str):
84     decimal_num = 0
85     binary_str = binary_str[::-1]
86     for index, digit in enumerate(binary_str):
87         if digit == '1':
88             decimal_num += 2 ** index
89     return decimal_num
90 try:
91     binary_input = input("Enter a binary number: ")
92     if not all(char in '01' for char in binary_input):
93         print("Invalid binary number")
94     else:
95         decimal_output = binary_to_decimal(binary_input)
96         print(f"Decimal equivalent of binary {binary_input} is {decimal_output}")
97 except ValueError:
98     print("Invalid input")
```

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py	Enter a binary number: 0101		Decimal equivalent of binary 0101 is 5	
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py	Enter a binary number: 00010110		Decimal equivalent of binary 00010110 is 22	
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py	Enter a binary number: -1		Invalid binary number	
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py	Enter a binary number: 0		Decimal equivalent of binary 0 is 0	
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py	Enter a binary number: 6500010		Invalid binary number	

1. It does **not check for empty input** (an empty string passes `all()` and is treated as valid).
2. It does **not handle leading/trailing spaces** (e.g., " 101 " should be stripped).
3. The try-except `ValueError` is **unnecessary**, because no `ValueError` can occur in this code.
4. It does not give feedback if the input is **too large**, which could cause performance issues.
5. The validation only checks characters, not **user intent or format** (like negative sign or prefixes such as `0b`).

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.

```
100  """
101  n=10
102  display 1010
103  """
104  def decimal_to_binary(num):
105      if num == 0:
106          return "0"
107      binary_str = ""
108      while num > 0:
109          binary_str = str(num % 2) + binary_str
110          num //= 2
111      return binary_str
112  try:
113      a = int(input("Enter a decimal number: "))
114      if a < 0:
115          print("Invalid input")
116      else:
117          binary_result = decimal_to_binary(a)
118          print(binary_result)
119  except ValueError:
120      print("Invalid input")
121
```

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: 8				
1000				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: 0				
0				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: -1				
Invalid input				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: 10				
1010				

```
122 #Generate a python function that reads a number and converts it to binary number
123 def convert_to_binary(num):
124     if num == 0:
125         return "0"
126     binary_str = ""
127     while num > 0:
128         binary_str = str(num % 2) + binary_str
129         num //= 2
130     return binary_str
131 try:
132     a = int(input("Enter a decimal number: "))
133     if a < 0:
134         print("invalid")
135     else:
136         binary_result = convert_to_binary(a)
137         print(binary_result)
138 except ValueError:
139     print("invalid")
```

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: 10				
1010				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: -1				
invalid				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: 0				
0				
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py				
Enter a decimal number: 7				
111				

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

```
141 '''
142 n=18
143 display Harshad Number
144 n=19
145 display Not a Harshad Number
146 n=-5
147 display Invalid Input
148 n=abc
149 display Invalid Input
150 '''
151 def is_harshad_number(num):
152     if num <= 0:
153         return "Invalid Input"
154     digit_sum = sum(int(digit) for digit in str(num))
155     if num % digit_sum == 0:
156         return "Harshad Number"
157     else:
158         return "Not a Harshad Number"
159 try:
160     a = int(input("Enter a number: "))
161     result = is_harshad_number(a)
162     print(result)
163 except ValueError:
164     print("Invalid Input")
```

PROBLEMS	OUTPUT	DEBUG CONSOLE	TERMINAL	PORTS
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```
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter a number: 19
Not a Harshad Number
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter a number: 21
Harshad Number
PS C:\Users\gudah> & C:/Python314/python.exe c:/Users/gudah/OneDrive/Documents/AIAC/Lab_assignment_3.5.py
Enter a number: -1
Invalid Input
```

Robustness of the code:

- The code safely handles **non-numeric input** using try-except, preventing crashes.
- It checks for **invalid values (zero or negative numbers)** before processing.
- The digit sum is calculated reliably by converting the number to a string.
- Returning clear messages like "Harshad Number" and "Invalid Input" improves user feedback.
- Overall, the program is **robust for normal user input**, though returning booleans instead of strings would improve reusability.