



## LAB ASSIGNMENT-4.2

### Assignment-4.2

#### Task-1:

- **Zero-shot:**
- Prompt AI with only the instruction — Write a Python function to generate the Fibonacci sequence up to n terms

```
 def fibonacci_sequence(n):  
    """Generates the Fibonacci sequence up to n terms."""  
    sequence = []  
    a, b = 0, 1  
    for _ in range(n):  
        sequence.append(a)  
        a, b = b, a + b  
    return sequence  
  
# Example usage:  
print(fibonacci_sequence(10))
```

```
 [0, 1, 1, 2, 3, 5, 8, 13, 21, 34]
```

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#### Explanation:

- **def fibonacci\_sequence(n)::** This line defines the function named fibonacci\_sequence that takes one argument, n, which represents the number of terms in the sequence you want to generate.
- **"""Generates the Fibonacci sequence up to n terms.""":** This is a docstring, which explains what the function does.

- **sequence = []:** This initializes an empty list called sequence. This list will store the generated Fibonacci numbers.
- **a, b = 0, 1:** This initializes two variables, a and b, with the first two numbers of the Fibonacci sequence, which are 0 and 1.
- **for \_ in range(n):** This starts a for loop that will iterate n times. The \_ is used as a variable name when you don't need to use the loop counter within the loop.
- **sequence.append(a):** In each iteration, the current value of a (which represents the next Fibonacci number) is added to the sequence list.
- **a, b = b, a + b:** This is the core of the Fibonacci logic. It updates the values of a and b for the next iteration. The new a becomes the current b, and the new b becomes the sum of the current a and b.
- **return sequence:** After the loop finishes, the function returns the sequence list containing the generated Fibonacci numbers.

## Task-2:

- **One-shot:**
- Provide one example: Input: 100, Output: 37.78 to help AI generate a function that converts Fahrenheit to Celsius

```
def fahrenheit_to_celsius(fahrenheit):
    """Converts Fahrenheit to Celsius."""
    celsius = (fahrenheit - 32) * 5/9
    return celsius

# Example usage based on the one-shot prompt:
# Input: 100, Output: 37.78
input_fahrenheit = 100
expected_celsius = 37.78
calculated_celsius = fahrenheit_to_celsius(input_fahrenheit)

print(f"Input Fahrenheit: {input_fahrenheit}")
print(f"Calculated Celsius: {calculated_celsius}")
print(f"Expected Celsius: {expected_celsius}")

# You can add an assertion to check if the output is close to the expected value
# assert abs(calculated_celsius - expected_celsius) < 0.01, "Calculated Celsius is not close to the expected value"
```

Input Fahrenheit: 100  
Calculated Celsius: 37.77777777777778  
Expected Celsius: 37.78

## Explanation:

- **def fahrenheit\_to\_celsius(fahrenheit)::** This line defines a function named `fahrenheit_to_celsius` that takes one argument, `fahrenheit`, which is the temperature in degrees Fahrenheit that you want to convert.
- **"""Converts temperature from Fahrenheit to Celsius."""**: This is a docstring explaining what the function does.
- **celsius = (fahrenheit - 32) \* 5/9**: This is the core of the conversion. It applies the standard formula to convert Fahrenheit to Celsius: subtract 32 from the Fahrenheit temperature and then multiply the result by 5/9. The result is stored in the `celsius` variable.
- **return celsius**: The function returns the calculated Celsius temperature.

## Task-3:

- **Prompt: Few-shot:**
- Give 2–3 examples to create a function that extracts the domain name from an email address.
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```
def extract_domain(email):  
    """Extracts the domain name from an email address."""  
    try:  
        domain = email.split('@')[1]  
        return domain  
    except IndexError:  
        return "Invalid email format"  
  
# Example usage 1  
email1 = "abc@gmail.com"  
domain1 = extract_domain(email1)  
print(f"The domain for {email1} is: {domain1}")  
  
# Example usage 2  
email2 = "user@example.org"  
domain2 = extract_domain(email2)  
print(f"The domain for {email2} is: {domain2}")  
  
# Example usage 3  
email3 = "another.user@sub.domain.co.uk"  
domain3 = extract_domain(email3)  
print(f"The domain for {email3} is: {domain3}")
```

The domain for [abc@gmail.com](#) is: gmail.com  
The domain for [user@example.org](#) is: example.org  
The domain for [another.user@sub.domain.co.uk](#) is: sub.domain.co.uk

## Explanation:

- **def extract\_domain(email):**: This line defines a function named `extract_domain` that takes one argument, `email`, which is the email address as a string.
- **"""Extracts the domain name from an email address."""**: This is a docstring explaining the function's purpose.
- **try:**: This starts a try block, which is used for error handling. Code within this block is attempted, and if an error occurs, the code in the except block is executed.

- **domain = email.split('@')[1]:** This is the core logic for extracting the domain.
  - `email.split('@')` splits the email string into a list of substrings using the "@" symbol as the delimiter. For example, `"abc@gmail.com".split('@')` would result in `['abc', 'gmail.com']`.
  - `[1]` accesses the element at index 1 of the resulting list, which is the part after the "@" symbol (the domain name).
  - The extracted domain is stored in the domain variable.
- **return domain:** If the split and indexing are successful, the function returns the extracted domain.
- **except IndexError::** This is the start of the except block, which catches an `IndexError`. An `IndexError` will occur if the `split('@')` operation does not produce a list with at least two elements (i.e., if there is no "@" symbol in the email address).
- **return "Invalid email format":** If an `IndexError` occurs (meaning the email format is invalid because it lacks an "@" symbol), the function returns the string "Invalid email format"

## Task-4

### Prompt:

Compare zero-shot vs few-shot prompting for generating a function that checks whether a word is a palindrome, ignoring punctuation and case

## Zero-shot:

```
✓ [6] import re
0s

def is_palindrome_zero_shot(word):
    """Checks if a word is a palindrome, ignoring punctuation and case."""
    # Remove punctuation and convert to lowercase
    cleaned_word = re.sub(r'^\w', '', word).lower()
    # Check if the cleaned word is equal to its reverse
    return cleaned_word == cleaned_word[::-1]

# Example usage (you can add examples here to test the function)
print(is_palindrome_zero_shot("Racecar"))
print(is_palindrome_zero_shot("A man, a plan, a canal: Panama"))
print(is_palindrome_zero_shot("hello"))
```

⇒ True  
True  
False

## Few-shot:

```

import re

# Few-shot examples:
# Input: "Racecar", Output: True
# Input: "A man, a plan, a canal: Panama", Output: True
# Input: "hello", Output: False

def is_palindrome_few_shot(word):
    """Checks if a word is a palindrome, ignoring punctuation and case."""
    # Remove punctuation and convert to lowercase
    cleaned_word = re.sub(r'^\w+', '', word).lower()
    # Check if the cleaned word is equal to its reverse
    return cleaned_word == cleaned_word[::-1]

# Example usage
print(is_palindrome_few_shot("Racecar"))
print(is_palindrome_few_shot("A man, a plan, a canal: Panama"))
print(is_palindrome_few_shot("hello"))

```

```

True
True
False

```

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few-shot prompting for generati  
a palindrome, ignoring punctuati

Certainly. I can generate a Pytho

## Comparision:

Feature	Zero-Shot Prompting	Few-Shot Prompting
Examp les Provided	No examples of input/output are given.	A few examples of input/output are given to guide the model.
Guidanc e Level	Relies solely on the model's pre-training and understanding of the task description.	Provides explicit examples to demonstrate the desired behavior and output format.
Complex ity of Task	More suitable for simpler, well-defined tasks where the expected output is unambiguous.	Can be more effective for complex or nuanced tasks where examples help clarify the requirements.
Outcome (in this case)	Generated a correct function for checking palindromes, ignoring punctuation and case.	Generated the same correct function for checking palindromes, ignoring punctuation and case, as the task was relatively simple.
Code Generate d	is_palindrome_zero_shot function	is_palindrome_few_shot function (identical code to zero-shot in this case)

## Explanation:

- The two functions to check for palindromes, one using a zero-shot prompt (is\_palindrome\_zero\_shot) and one using a few-shot prompt (is\_palindrome\_few\_shot).
- In this particular case, the code generated for both functions and examples is the same

## Task-5:

- **Prompt:** Use few-shot prompting with 3 sample inputs to generate a function that determines the maximum of three numbers without using the built-in max() function.

```
# Few-shot examples:
# Input: 5, 10, 3, Output: 10
# Input: -1, -5, 0, Output: 0
# Input: 7, 7, 7, Output: 7

def find_maximum(a, b, c):
    """Determines the maximum of three numbers without using the built-in max() function."""
    maximum = a
    if b > maximum:
        maximum = b
    if c > maximum:
        maximum = c
    return maximum

# Example usage 1
num1, num2, num3 = 5, 10, 3
max_num = find_maximum(num1, num2, num3)
print(f"The maximum of {num1}, {num2}, and {num3} is: {max_num}")

# Example usage 2
num4, num5, num6 = -1, -5, 0
max_num2 = find_maximum(num4, num5, num6)
print(f"The maximum of {num4}, {num5}, and {num6} is: {max_num2}")

# Example usage 3
num7, num8, num9 = 7, 7, 7
max_num3 = find_maximum(num7, num8, num9)
print(f"The maximum of {num7}, {num8}, and {num9} is: {max_num3}")

The maximum of 5, 10, and 3 is: 10
The maximum of -1, -5, and 0 is: 0
The maximum of 7, 7, and 7 is: 7
```



## Explanation:

- **def find\_maximum(a, b, c)::** This line defines a function named `find_maximum` that takes three arguments: `a`, `b`, and `c`, which are the three numbers you want to compare.
- **"""Determines the maximum of three numbers without using the built-in max() function."""**: This is a docstring explaining the function's purpose.
- **maximum = a:** This line initializes a variable called `maximum` and assumes that the first number `a` is the maximum.
- **if b > maximum::** This is a conditional statement. It checks if the second number `b` is greater than the current value of `maximum`.
- **maximum = b:** If `b` is indeed greater than `maximum`, the value of `maximum` is updated to `b`.
- **if c > maximum::** This is another conditional statement. It checks if the third number `c` is greater than the current value of `maximum`.
- **maximum = c:** If `c` is greater than the current value of `maximum`, the value of `maximum` is updated to `c`.
- **return maximum:** After checking both `b` and `c` against the current `maximum`, the function returns the final value of `maximum`, which will be the largest of the three input numbers.