

**School of Computer Science and Artificial Intelligence**

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**Lab Assignment # 4.2**

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**Submission Starts here****Task Description-1**

- ❖ Zero-shot: Prompt AI with only the instruction. Write a Python function to determine
- ❖ whether a given number is prime

```
def is_prime(n):
    if n <= 1:
        return False
    for i in range(2, int(n ** 0.5) + 1):
        if n % i == 0:
            return False
    return True
n=int(input())
print(is_prime(n))

7
True
```

**Step-by-step explanation:****1. Function Definition**

- `def is_prime(n):`
- This function takes an integer `n` as input and checks whether it is a prime number.

**2. Check for invalid prime numbers**

- `if n <= 1:`
- Numbers less than or equal to 1 are **not prime**, so the function returns `False`.

### 3. Optimized loop for checking factors

- `for i in range(2, int(n ** 0.5) + 1):`
- A number only needs to be checked for divisibility up to its **square root**.
- If `n` has a factor greater than its square root, it must also have a smaller factor.

### 4. Divisibility test

- `if n % i == 0:`
- If `n` is divisible by any number `i` in the loop, it is **not prime**, so return `False`.

### 5. Prime confirmation

- `return True`
- If no divisors are found, the number is **prime**.

#### Example:

- `is_prime(7) → True` (7 has no divisors other than 1 and itself)
- `is_prime(10) → False` (10 is divisible by 2)

#### ❖ Task2:One-shot:

- ❖ Provide one example: Input: [1, 2, 3, 4], Output: 10 to help AI generate a function that calculates the sum of elements in a list.

```
def sum_of_list(nums):
    total = 0
    for num in nums:
        total += num
    return total
nums=list(map(int,input().split()))
print([sum_of_list(nums)])

... 1 2 3 4
10
```

**1. Function Definition**

- `def sum_of_list(nums):`
- This function accepts a list of numbers called `nums`.

**2. Initialize the sum**

- `total = 0`
- A variable `total` is created to store the running sum of the elements.

**3. Loop through the list**

- `for num in nums:`
- The loop goes through each element (`num`) in the list.

**4. Add each element**

- `total += num`
- Each number in the list is added to `total`.

**5. Return the result**

- `return total`
- After all elements are processed, the function returns the final sum.

**Example using the one-shot input:**

- Input: `[1, 2, 3, 4]`
- Calculation: `1 + 2 + 3 + 4 = 10`
- Output: `10`

## ❖ Task3:Few-shot :

- ❖ Give 2-3 examples to create a function that extracts digits from a alphanumeric string.

```
def extract_digits(s):
    result = ""
    for ch in s:
        if ch.isdigit():
            result += ch
    return result
s=input()
print(extract_digits(s))

... 12s34g5h6
    123456
```

### Explanation:

1. The function takes a string `s` as input.
2. An empty string `result` is initialized to store digits.
3. The function loops through each character in the string.
4. `isdigit()` checks whether the character is a digit (0-9).
5. If it is a digit, it is added to `result`.
6. Finally, the function returns all extracted digits as a string.

- ❖ **Task4:** Compare zero-shot vs few-shot prompting for generating a function that counts the number of vowels in a string.

```
def count_vowels(s):
    vowels = "aeiouAEIOU"
    count = 0
    for ch in s:
        if ch in vowels:
            count += 1
    return count
s=input()
print(count_vowels(s))

... vowels
    2
```

### Step-by-step explanation:

#### 1. Function definition

- `def count_vowels(s):`
- Defines a function named `count_vowels` that takes a string `s` as input.

## 2. Vowel list

- `vowels = "aeiouAEIOU"`
- Stores all lowercase and uppercase vowels.
- This ensures the function counts vowels regardless of case.

## 3. Initialize counter

- `count = 0`
- A variable to keep track of how many vowels are found.

## 4. Loop through the string

- `for ch in s:`
- Iterates over each character (`ch`) in the input string.

## 5. Check for vowels

- `if ch in vowels:`
- Checks whether the current character is a vowel.

## 6. Increase count

- `count += 1`
- Increments the counter whenever a vowel is found.

## 7. Return result

- `return count`
- Sends back the total number of vowels in the string.

## 8. User input

- `s = input()`
- Takes a string input from the user.

- `print(count_vowels(s))`
- Calls the function and prints the number of vowels

❖ **Task5:** Use few-shot prompting with 3 sample inputs to generate a function that determines the minimum of three numbers without using the built-in `min()` function.

```
def minimum_of_three(a, b, c):
    min_val = a
    if b < min_val:
        min_val = b
    if c < min_val:
        min_val = c
    return min_val
print(minimum_of_three(3,2,1))
print(minimum_of_three(3,2,4))
print(minimum_of_three(3,5,4))

... 1
     2
     3
```

### Explanation:

- The function starts by assuming `a` is the smallest.
- It compares `b` with the current minimum and updates if needed.
- It then compares `c` with the updated minimum.
- Finally, it returns the smallest of the three numbers.