Strings

Python strings are sequences of characters enclosed in either single quotes ('') or double quotes (""). They are immutable, which means that once a string is created, it cannot be changed.

Here are some common operations and methods that can be performed on strings in Python:

1. Concatenation: Strings can be concatenated using the `+` operator. For example: `python str1 = "Hello" str2 = "World" result = str1 + " " + str2 print(result) # Output: Hello World`

2. String formatting: Python provides different ways to format strings, such as using the `%` operator or the `format()` method. For example: `python name = "Alice" age = 25 message = "My name is %s and I am %d years old." % (name, age) print(message) # Output: My name is Alice and I am 25 years old.`

3. Accessing characters: Individual characters in a string can be accessed using indexing. Python uses zero-based indexing, so the first character is at index 0. For example: `python word = "Python" print(word[0]) # Output: P print(word[2]) # Output: t`

4. String methods: Python provides various built-in methods to manipulate strings. Some commonly used methods include `lower()`, `upper()`, `strip()`, `split()`, `replace()`, and `find()`. For example: `python sentence = " Hello, World! " print(sentence.lower()) # Output: hello, world! print(sentence.strip()) # Output: Hello, World! print(sentence.split(",")) # Output: [' Hello', ' World! ']`

These are just a few examples of what you can do with strings in Python. Strings are a fundamental data type in Python and are used extensively in various programming tasks.

```python
# 1. Write a Python program to count the number of words in a given string.

def count_words(s):
    return len(s.split())

# Example usage
s = "Hello world this is a test"
print("Number of words:", count_words(s))
```

```
Number of words: 6
```

```python
# 2. Write a Python program to count the number of vowels in a given string.

def count_vowels(s):
    vowels = "aeiouAEIOU"
    return sum(1 for char in s if char in vowels)
```

```python
# Example usage
s = "Hello world"
print("Number of vowels:", count_vowels(s))
```

```
Number of vowels: 3
```

```python
# 3. Write a Python program to check if a given string is a
palindrome.

def is_palindrome(s):
    return s == s[::-1]

# Example usage
s = "racecar"
print(f'"{s}" is a palindrome:', is_palindrome(s))
```

```
"racecar" is a palindrome: True
```

```python
# 4. Write a Python program to check if a given string contains only
digits.

def contains_only_digits(s):
    return s.isdigit()

# Example usage
s = "12345"
print(f'"{s}" contains only digits:', contains_only_digits(s))
```

```
"12345" contains only digits: True
```

```python
# 5. Write a Python program to remove all non-alphanumeric
characters from a string.

def remove_non_alphanumeric(s):
    return ''.join(char for char in s if char.isalnum())

# Example usage
s = "Hello, World!"
print("String after removing non-alphanumeric characters:",
remove_non_alphanumeric(s))
```

```
String after removing non-alphanumeric characters: HelloWorld
```

```python
# 6. Write a Python program to reverse a given string.

def reverse_string(s):
    return s[::-1]

# Example usage
s = "Hello World"
print("Reversed string:", reverse_string(s))
```

```
Reversed string: dlroW olleH
```

```python
# 7. Write a Python program to check if two strings are anagrams of each other.

def are_anagrams(s1, s2):
    return sorted(s1) == sorted(s2)
# Example usage
s1 = "listen"
s2 = "silent"
print(f'"{s1}" and "{s2}" are anagrams:', are_anagrams(s1, s2))
```

```
"listen" and "silent" are anagrams: True
```

```python
# 8. Write a Python program to remove all vowels from a given string.

def remove_vowels(s):
    vowels = "aeiouAEIOU"
    return ''.join(char for char in s if char not in vowels)
# Example usage
s = "Hello World"
print("String after removing vowels:", remove_vowels(s))
```

```
String after removing vowels: Hll Wrld
```

```python
# 9. Write a Python program to find all substrings of a given string.

def all_substrings(s):
    return [s[i:j] for i in range(len(s)) for j in range(i + 1, len(s) + 1)]
# Example usage
s = "abc"
print("All substrings:", all_substrings(s))
```

```
All substrings: ['a', 'ab', 'abc', 'b', 'bc', 'c']
```

```python
# 10. Write a Python program to sort words in a given sentence in alphabetical order.

def sort_words(s):
    return ' '.join(sorted(s.split()))
# Example usage
s = "hello world this is a test"
print("Sorted words:", sort_words(s))
```

```
Sorted words: a hello is test this world
```

```python
# 11. Write a Python program to count the number of consonants and vowels in a given string.

def count_vowels_consonants(s):
    vowels = "aeiouAEIOU"
    num_vowels = sum(1 for char in s if char in vowels)
    num_consonants = sum(1 for char in s if char.isalpha() and char not in vowels)
```

```
    return num_vowels, num_consonants
# Example usage
s = "hello world"
num_vowels, num_consonants = count_vowels_consonants(s)
print("Number of vowels:", num_vowels)
print("Number of consonants:", num_consonants)
```

```
Number of vowels: 3
Number of consonants: 7
```

```
# 12. Write a Python program to find the length of a string without
using the built-in len() function.

def string_length(s):
    length = 0
    for char in s:
        length += 1
    return length
# Example usage
s = "hello world"
print("Length of the string:", string_length(s))
```

```
Length of the string: 11
```

```
# 13. Write a Python program to check if a given string is a
palindrome using function.

def is_palindrome(s):
    return s == s[::-1]
# Example usage
s = "racecar"
print(f'"{s}" is a palindrome:', is_palindrome(s))
```

```
"racecar" is a palindrome: True
```

```
# 14. Write a Python program to remove leading and trailing
whitespace from the string " hello ".

def remove_whitespace(s):
    return s.strip()
# Example usage
s = " hello "
print("String after removing leading and trailing whitespace:",
remove_whitespace(s))
```

```
String after removing leading and trailing whitespace: hello
```

```
# 15. Write a Python program to find the index of the character 'w'
in the string "hello world".

def find_index(s, char):
    return s.index(char)
# Example usage
s = "hello world"
```

```
char = 'w'
print(f"Index of character '{char}':", find_index(s, char))
```

```
Index of character 'w': 6
```

```
# 16. Write a Python program to remove all punctuation from the
string "hello, world!".

def remove_punctuation(s):
    return ''.join(char for char in s if char.isalnum() or
char.isspace())
# Example usage
s = "hello, world!"
print("String after removing punctuation:", remove_punctuation(s))
```

```
String after removing punctuation: hello world
```

```
# 17. Write a Python program to convert the string "hello world" to
uppercase.

def to_uppercase(s):
    return s.upper()
# Example usage
s = "hello world"
print("Uppercase string:", to_uppercase(s))
```

```
Uppercase string: HELLO WORLD
```

```
# 18. Write a Python program to find the length of the string
"OpenAI".

def string_length(s):
    length = 0
    for char in s:
        length += 1
    return length
# Example usage
s = "OpenAI"
print("Length of the string:", string_length(s))
```

```
Length of the string: 6
```

```
# 19. Write a Python program to swap the case of all characters in
the string "Hello World".

def swap_case(s):
    return ''.join([char.lower() if char.isupper() else char.upper()
for char in s])
# Example usage
s = "Hello World"
print("Swapped case string:", swap_case(s))
```

```
Swapped case string: hELLO wORLD
```