Python: Lists

## 1. Characteristics of Lists

- Ordered collection of elements  
- Allows heterogeneous data types (numbers, strings, etc.)  
- Mutable (can be modified after creation)  
- Allows duplicate values  
- Defined using square brackets [ ]

example = [10, "Python", 3.14, True]  
print(example) # Output: [10, 'Python', 3.14, True]

## 2. Operations on Lists

Some basic operations are: Concatenation, Repetition, Adding & Removing elements.

- Concatenation (+):

a = [1, 2]; b = [3, 4]  
print(a + b) # Output: [1, 2, 3, 4]

- Repetition (\*):

x = [7, 8]  
print(x \* 2) # Output: [7, 8, 7, 8]

## 3. Accessing Elements

Lists can be accessed using indexing and slicing.

numbers = [10, 20, 30, 40, 50]  
print(numbers[0]) # Output: 10  
print(numbers[-1]) # Output: 50  
print(numbers[1:4]) # Output: [20, 30, 40]

## 4. Built-in Functions

- len(): Returns number of elements.

nums = [1, 2, 3]  
print(len(nums)) # Output: 3

- max(): Returns maximum element.

marks = [85, 92, 78]  
print(max(marks)) # Output: 92

- min(): Returns minimum element.

marks = [85, 92, 78]  
print(min(marks)) # Output: 78

- sum(): Returns sum of elements.

nums = [1, 2, 3]  
print(sum(nums)) # Output: 6

## 5. List Methods

- append(): Adds an element at the end.

fruits = ["apple"]  
fruits.append("banana")  
print(fruits) # Output: ['apple', 'banana']

- insert(): Inserts element at index.

fruits = ["apple", "banana"]  
fruits.insert(1, "cherry")  
print(fruits) # Output: ['apple', 'cherry', 'banana']

- extend(): Adds another list.

a = [1, 2]  
b = [3, 4]  
a.extend(b)  
print(a) # Output: [1, 2, 3, 4]

- remove(): Removes first occurrence.

nums = [1, 2, 2, 3]  
nums.remove(2)  
print(nums) # Output: [1, 2, 3]

- pop(): Removes element by index (last by default).

nums = [10, 20, 30]  
nums.pop()  
print(nums) # Output: [10, 20]

- clear(): Removes all elements.

nums = [1, 2, 3]  
nums.clear()  
print(nums) # Output: []

- index(): Returns index of value.

fruits = ["apple", "banana"]  
print(fruits.index("banana")) # Output: 1

- count(): Counts occurrences of value.

nums = [1, 2, 2, 3]  
print(nums.count(2)) # Output: 2

## 6. Sorting and Reversing

- sort(): Sorts in ascending order.

numbers = [4, 2, 1, 3]  
numbers.sort()  
print(numbers) # Output: [1, 2, 3, 4]

- reverse(): Reverses order of elements.

numbers = [1, 2, 3, 4]  
numbers.reverse()  
print(numbers) # Output: [4, 3, 2, 1]

## 7. Copying Lists

original = [1, 2, 3]  
copy1 = original.copy()  
print(copy1) # Output: [1, 2, 3]  
  
copy2 = original[:]  
print(copy2) # Output: [1, 2, 3]