**Python Lists — Complete Notes**

**✅ What is a List?**

A **list** is a **mutable, ordered collection** of items in Python. It can hold elements of **different data types** (int, str, float, etc.).

my\_list = [1, 2, 3, "hello", 4.5, True]

**📌 Key Features of Lists**

| **Property** | **Value** |
| --- | --- |
| Ordered | ✅ Yes |
| Mutable | ✅ Yes (Changeable) |
| Duplicates allowed | ✅ Yes |
| Heterogeneous data | ✅ Yes (Mixed types) |
| Indexing | ✅ Yes (0-based) |
| Slicing | ✅ Yes |

**🛠️ Creating Lists**

# Empty list

a = []

# List of numbers

nums = [1, 2, 3, 4]

# Mixed data types

mixed = [1, "apple", 3.14, True]

# Using list() constructor

lst = list(("apple", "banana", "cherry"))

**📥 Accessing List Elements**

colors = ["red", "green", "blue"]

print(colors[0])      # Output: red

print(colors[-1])     # Output: blue (negative index)

**🔁 Looping Through a List**

for color in colors:

    print(color)

# Using index

for i in range(len(colors)):

    print(i, colors[i])

**✂️ List Slicing**

a = [10, 20, 30, 40, 50]

print(a[1:4])   # [20, 30, 40]

print(a[:3])    # [10, 20, 30]

print(a[-2:])   # [40, 50]

**⚙️ Modifying Lists (Mutability)**

a = [1, 2, 3]

a[0] = 100

print(a)        # [100, 2, 3]

**➕ Adding Elements**

# append() – adds to end

a.append(4)

# insert(index, value)

a.insert(1, 50)

# extend() – merge another list

a.extend([5, 6])

a.remove(2)     # removes value 2

a.pop()         # removes last item

a.pop(0)        # removes index 0

del a[1]        # deletes index 1

a.clear()       # empties the list

**🔍 Searching in List**

a = [10, 20, 30, 40]

print(20 in a)         # True

print(a.index(30))     # 2

**📏 Length & Count**

len(a)             # Number of elements

a.count(10)        # Occurrences of 10

**🔄 Sorting & Reversing**

nums = [3, 1, 4, 2]

nums.sort()        # Ascending

nums.sort(reverse=True)  # Descending

nums.reverse()     # Reverse the list

**📋 Copying Lists**

# Shallow copy

new\_list = old\_list.copy()

# Or

new\_list = old\_list[:]

**🧪 List Comprehension**

squares = [x\*x for x in range(5)]   # [0, 1, 4, 9, 16]

**🧰 Built-in Functions on Lists**

| **Function** | **Description** | **Example** |
| --- | --- | --- |
| len() | Length of list | len([1,2,3]) → 3 |
| max() | Maximum element | max([1,5,2]) → 5 |
| min() | Minimum element | min([1,5,2]) → 1 |
| sum() | Sum of elements | sum([1,2,3]) → 6 |
| sorted() | Returns a new sorted list | sorted([3,1,2]) → [1,2,3] |
| list() | Converts iterable to list | list("abc") → ['a','b','c'] |

**🔗 Common List Methods (With Example)**

fruits = ['apple', 'banana', 'cherry']

fruits.append('orange') # ['apple', 'banana', 'cherry', 'orange']

fruits.insert(1, 'mango') # ['apple', 'mango', 'banana', ...]

fruits.remove('banana') # Removes 'banana'

fruits.pop() # Removes last item

fruits.index('apple') # Returns index

fruits.count('apple') # Counts how many times 'apple'

fruits.sort() # Sorts list alphabetically

fruits.reverse() # Reverses the list

fruits.copy() # Copies list

fruits.clear() # Empties list

**🧠 Why Use Lists?**

* When you need to **store a sequence of values** (numbers, strings, etc.)
* Useful in **loops**, **data processing**, and **dynamic collections**
* Supports **mutability**, making it ideal for changing data

**✅ Summary Table**

| **Feature** | **Supported** |
| --- | --- |
| Mutable | ✅ Yes |
| Indexed | ✅ Yes |
| Slicing | ✅ Yes |
| Heterogeneous | ✅ Yes |
| Duplicate items | ✅ Yes |