

Python List - Complete Guide

1. What is a List?

A list is an ordered, mutable, and iterable collection of items in Python.

Example: `my_list = [1, 2, 3, "hello", True]`

2. Creating a List

```
empty_list = []
```

```
numbers = [1, 2, 3, 4, 5]
```

```
mixed = [1, "Python", 3.14, False]
```

```
nested = [[1, 2], [3, 4]]
```

3. Indexing

```
my_list = ['a', 'b', 'c']
```

```
print(my_list[0]) # 'a'
```

```
print(my_list[-1]) # 'c'
```

4. Slicing

```
my_list = [10, 20, 30, 40, 50]
```

```
print(my_list[1:4]) # [20, 30, 40]
```

```
print(my_list[:3]) # [10, 20, 30]
```

```
print(my_list[::2]) # [10, 30, 50]
```

5. Iterating Over a List

```
for item in my_list:
```

```
    print(item)
```

6. Adding Elements

```
my_list.append(6)
```

```
my_list.insert(2, 'new')
```

```
my_list.extend([7, 8])
```

7. Removing Elements

```
my_list.remove('a')
```

```
my_list.pop(1)
```

```
del my_list[2]
```

```
my_list.clear()
```

8. Modifying Elements

```
my_list[1] = "updated"
```

9. Searching in a List

```
'hello' in my_list
```

```
index = my_list.index('hello')
```

```
count = my_list.count('hello')
```

10. Length of List

```
len(my_list)
```

11. Sorting and Reversing

```
my_list.sort()
```

```
my_list.sort(reverse=True)
```

```
my_list.reverse()
```

12. Copying a List

```
new_list = my_list.copy()

new_list = my_list[:]
```

13. List Comprehensions

```
squares = [x*x for x in range(5)]

evens = [x for x in range(10) if x % 2 == 0]
```

14. Nested Lists

```
matrix = [[1, 2], [3, 4]]

print(matrix[0][1]) # 2
```

15. List vs Tuple

Feature	List	Tuple
-----	-----	-----
Mutable	Yes	No
Syntax	[1, 2]	(1, 2)
Performance	Slower	Faster

16. Useful Built-in Functions

```
sum([1, 2, 3])

min([1, 2, 3])

max([1, 2, 3])

sorted([3, 1, 2])

list("abc")
```

17. Unpacking Lists

```
a, b, c = [1, 2, 3]
```

```
first, *rest = [1, 2, 3, 4]
```

18. Joining Lists

```
a = [1, 2]
```

```
b = [3, 4]
```

```
c = a + b
```

19. Repeating Elements

```
my_list = [0] * 5
```

20. Common Mistakes

- Modifying a list while iterating
- Using `list1 = list2` (reference, not copy)

Advanced Tips:

- `any()`, `all()`, `enumerate()`, `zip()`

Example:

```
for i, val in enumerate(['a', 'b']):
```

```
    print(i, val)
```