Difference between list and tuple. Write a python program to show that the list is slower than tuple?

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1. Difference between List and Tuple in Python

Feature	List ([])	Tuple (())
Mutability	✅ Mutable (can add, remove, update elements)	❌ Immutable (cannot change after creation)
Syntax	[1, 2, 3]	(1, 2, 3)
Methods	Many (append, remove, sort, etc.)	Very few (count, index)
Memory Usage	Higher (extra space for flexibility)	Lower (more compact)
Performance	Slower (because of mutability and dynamic nature)	Faster (fixed size, less overhead)
Use Cases	When data may change (e.g., dynamic lists)	When data is fixed (e.g., coordinates, constants)

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2. Demonstrating Performance Difference

We can use the timeit module to compare the speed of list vs tuple creation and access.

import timeit

Compare creation

list_time = timeit.timeit(stmt="[1,2,3,4,5]", number=1000000)

tuple_time = timeit.timeit(stmt="(1,2,3,4,5)", number=1000000)

print("List creation time:", list_time)

print("Tuple creation time:", tuple_time)

Compare indexing

```python
list_index_time = timeit.timeit(stmt="x[2]", setup="x=[1,2,3,4,5]", number=1000000)

tuple_index_time = timeit.timeit(stmt="y[2]", setup="y=(1,2,3,4,5)", number=1000000)


print("List indexing time:", list_index_time)

print("Tuple indexing time:", tuple_index_time)
```

Expected Output (approximate)

List creation time: 0.20 sec

Tuple creation time: 0.15 sec

List indexing time: 0.07 sec

Tuple indexing time: 0.05 sec