



1. Collegiate Python Quiz (20 Questions)

Part A: Advanced Language Concepts

1. Decorators and Arguments

What is the first argument automatically passed to a decorator function in Python when it is used without parentheses (e.g., `@my_decorator`)?

- A. The name of the decorator.
- B. The function being decorated.
- C. A tuple of the decorated function's arguments.
- D. An instance of the class containing the decorated method.

2. Generators vs. Functions

Which statement is true regarding Python generators?

- A. They use the `return` keyword to return a sequence of values all at once.

- B. They use the yield keyword and can pause and resume execution, saving state between calls.
- C. They can only be used with for loops and cannot be passed to functions like list() or sum().
- D. They execute entirely upon the first call, storing the results in memory.

3. Context Managers

Which pair of Dunder methods must a class implement to be used as a context manager with the with statement?

- A. `__init__` and `__del__`
- B. `__enter__` and `__exit__`
- C. `__setitem__` and `__getitem__`
- D. `__start__` and `__finish__`

4. Mutability Pitfall

What is a common pitfall when using a list or dictionary as a default argument in a Python function definition?

- A. It causes a `TypeError` when the function is defined.
- B. The interpreter creates a new object every time the function is called.
- C. The default mutable object is shared across all subsequent calls to the function.
- D. The default value is automatically converted to an immutable tuple.

5. Time Complexity

Under average circumstances, what is the time complexity (Big O notation) for searching for a key in a Python dict?

- A. $O(n)$
- B. $O(\log n)$
- C. $O(n^2)$
- D. $O(1)$

Part B: Object-Oriented Programming (OOP)

6. Method Resolution Order (MRO)

What algorithm does Python use to determine the Method Resolution Order (MRO) for classes that employ multiple inheritance?

- A. Depth-first search (DFS).
- B. C3 linearization.
- C. Breadth-first search (BFS).
- D. Topological sort based on the class definition order.

7. Operator Overloading

Which Dunder method is automatically called when you use the + operator on two custom class instances (e.g., A + B)?

- A. `__call__`
- B. `__new__`
- C. `__add__`
- D. `__iadd__`

8. Metaclasses

What is the fundamental purpose of a metaclass in Python?

- A. To automatically create or modify classes when they are defined.
- B. To validate arguments passed to a class constructor (`__init__`).
- C. To manage the state and life cycle of class instances.
- D. To implement abstract base classes (ABCs).

9. Iterables and Iterators

An object is considered iterable (i.e., can be used in a for loop) if it defines which Dunder method?

- A. `__next__`
- B. `__iter__`
- C. `__getitem__`

D. `__len__`

10. Extended Unpacking

In Python's Extended Iterable Unpacking (PEP 3132), what does the star operator (*) assign the remaining elements to, as in `first, *middle, last = sequence`?

A. A tuple.

B. A set.

C. A generator.

D. A list.

Part C: Concurrency and Control Flow

11. Global Interpreter Lock (GIL)

The Global Interpreter Lock (GIL) in CPython primarily affects which type of workload in multi-threaded applications?

A. I/O-bound tasks, as they are released by the GIL.

B. Network-bound tasks, as they require specialized libraries.

C. CPU-bound tasks, as it prevents multiple threads from executing Python bytecodes simultaneously.

D. Memory-bound tasks, as it controls access to the heap.

12. Asynchronous Programming

In Python's `asyncio`, what are the two main keywords used to define and pause/resume coroutines?

A. `def` and `yield`

B. `begin` and `pause`

C. `async` and `await`

D. `thread` and `join`

13. Exception Handling

In a `try...except...else...finally` block, when is the code inside the `else` block guaranteed to execute?

- A. When an exception occurs in the except block.
- B. Only if the try block executes without raising any exceptions.
- C. Always, regardless of whether an exception occurred.
- D. Only if the finally block is skipped.

14. Closures

Which keyword is used inside a nested function to modify a variable in the nearest enclosing (non-global) scope?

- A. global
- B. scope
- C. nonlocal
- D. outer

15. Lambda Functions

A Python lambda function is limited to containing how many expressions?

- A. An unlimited number of simple statements.
- B. One single expression.
- C. Two expressions separated by a comma.
- D. Only simple variable assignments.

Part D: Standard Library and Tooling

16. Serialization

What is the name of the standard Python module used to serialize and deserialize arbitrary Python objects (for object persistence) into a binary format?

- A. json
- B. marshal
- C. pickle
- D. struct

17. F-strings Debugging

Which feature of modern f-strings (Formatted String Literals) allows for better debugging by printing both the variable name and its value?

- A. The format specifier `!d`.
- B. The use of the star operator `*var`.
- C. The self-documenting expression and debugging specifier `(=)`.
- D. The `__repr__` output modifier `!r`.

18. Virtual Environments

What is the name of the built-in Python module used to create and manage isolated virtual environments?

- A. `virtualenv` (external tool, not built-in)
- B. `pipenv` (external tool, not built-in)
- C. `venv`
- D. `isolate`

19. Type Hinting

In modern Python type hinting, how would you indicate that a function argument can accept either an integer or a string?

- A. `argument: int or str`
- B. `argument: (int, str)`
- C. `argument: Union[int, str]` or `argument: int | str`
- D. `argument: Any`

20. Set Comprehension

Which expression correctly creates a set of all unique even numbers from the list `L = [1, 2, 3, 4, 5, 6, 2, 4]`?

- A. `[x for x in L if x % 2 == 0]`
- B. `{x for x in L if x % 2 == 0}`
- C. `(x for x in L if x % 2 == 0)`

D. `list(filter(lambda x: x % 2 == 0, L))`