# Python and Programming - Questions and Answers

51. Describe the differences between Python 2 and Python 3.

Python 2 is an older version that is no longer maintained, while Python 3 is the current and actively developed version. Python 3 introduced several improvements and changes, such as print being a function, better Unicode support, and integer division behavior.

52. What is the Global Interpreter Lock (GIL) in Python, and how does it affect multi-threading?

The GIL is a mutex that protects access to Python objects, preventing multiple native threads from executing Python bytecodes at once. This means that multi-threading in Python may not lead to performance gains in CPU-bound tasks, though it can still be useful for I/O-bound tasks.

53. Explain the use of decorators in Python.

Decorators are functions that modify the behavior of other functions or methods. They are often used for logging, access control, memoization, and instrumentation.

54. What are list comprehensions, and how do they work?

List comprehensions provide a concise way to create lists. They consist of brackets containing an expression followed by a for clause, and optionally if clauses.

55. Describe the purpose of virtual environments in Python.

Virtual environments allow you to create isolated environments for Python projects, each with its own dependencies, to avoid conflicts between packages.

56. How can you handle exceptions in Python?

Exceptions in Python are handled using try-except blocks. You can also use finally for cleanup actions and else for code that should run if no exception occurs.

57. What is a lambda function, and where is it typically used?

A lambda function is an anonymous function defined with the lambda keyword. It is typically used for short, throwaway functions, often as arguments to higher-order functions like map, filter, and sorted.

58. Explain the difference between shallow and deep copy in Python.

A shallow copy creates a new object but inserts references into it to the objects found in the original. A deep copy creates a new object and recursively copies all objects found in the original.

59. What is the purpose of the map() and filter() functions in Python?

The map() function applies a given function to all items in an iterable. The filter() function constructs an iterator from elements of an iterable for which a function returns true.

60. Describe the difference between append() and extend() methods for lists.

append() adds its argument as a single element to the end of a list, while extend() iterates over its argument and adds each element to the list.