Functional Programming Lab 02

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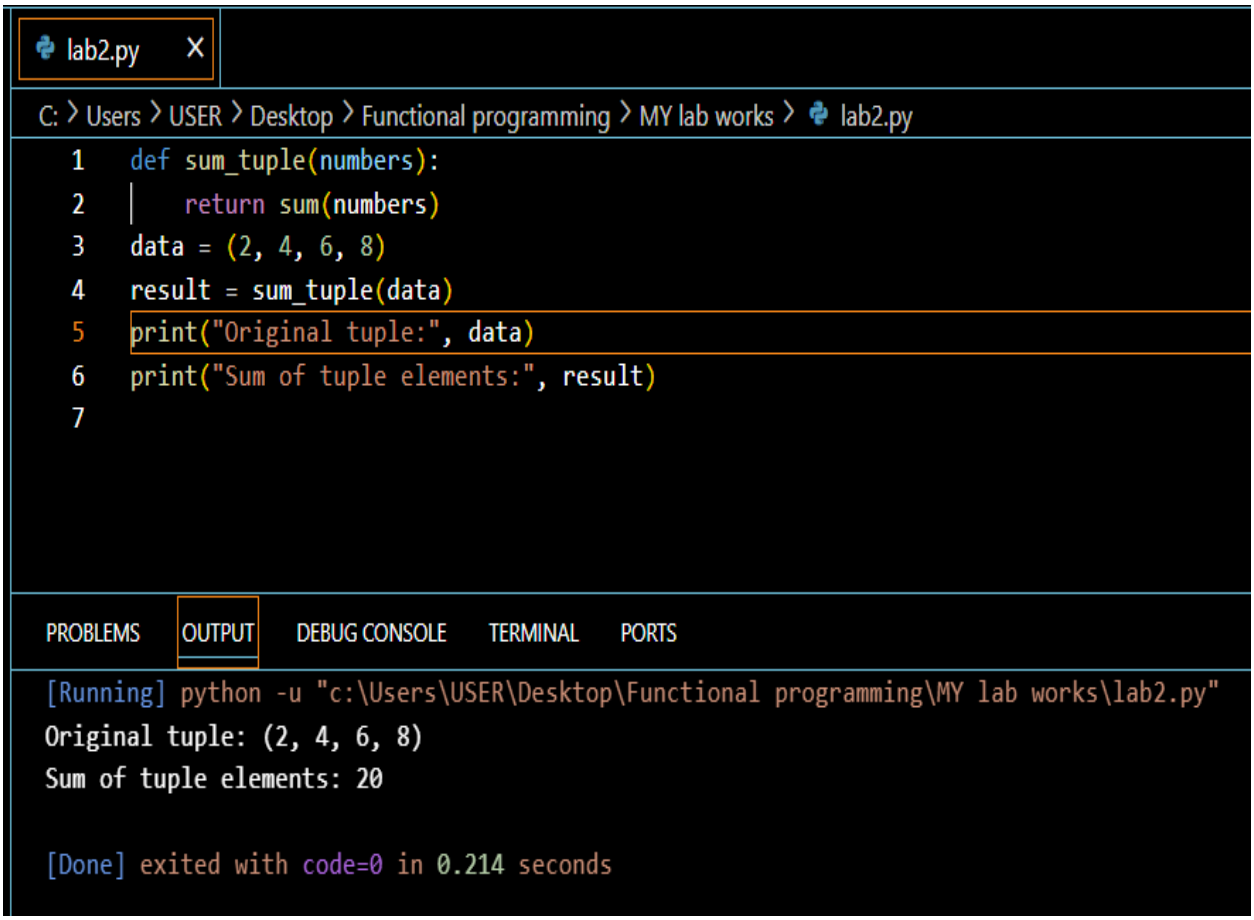
Objective: To explore the concepts of functions and data immutability in the context of functional programming in Python. The goal is to deepen understanding of how functions can be used to create modular, efficient, and safe code, and how immutability helps prevent side effects.

Individual Task:

Task: Summation Function

Write a pure function to sum all elements in a tuple.



1. What is a pure function in the context of functional programming?
   A function that always returns the same output for the same input and has no side effects
2. How does data immutability affect functional programming?
   #Immutability ensures data cannot be changed after creation, making programs more predictable and reliable.
3. Give an example of a higher-order function in Python.
   Built-in functions like map(), filter(), and reduce(), which take other functions as arguments
4. How can immutable data structures be implemented in Python?
   It could be can be implemented using types like tuples, strings, and frozensets
5. What problems are solved by using pure functions?
   Pure functions simplify debugging, testing, and reasoning about code because they don't rely on or alter external state
6. Can pure functions improve program performance? If yes, how?
   Yes, through techniques like memoization, where previous results are stored to avoid repeated computation.
7. What are side effects in programming, and how are they related to pure functions?
   Side effects occur when a function modifies external state. Pure functions avoid side effects entirely
8. How can higher-order functions improve the flexibility and modularity of code?
   They allow passing functions as arguments or returning them, enabling reusable and modular design
9. Explain how tuples in Python can be used to ensure data immutability.
   Since tuples are immutable sequences, so their elements cannot be modified after creation, ensuring safe data handling
10. How does data immutability affect parallel and asynchronous programming?
    Immutability eliminates data races and synchronization issues, making concurrent code safer and easier to manage