Lambda Expressions Python

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Introduction to Lambda Expressions

- **What are lambda expressions?**
  - Anonymous functions defined using the *lambda* keyword
  - Useful for short, throwaway functions.
- **Syntax and Structure**:

lambda arguments: expression

Explanation of components:

  - arguments
  - single expression

Examples

```
double = lambda x: x* 2
print(double(4))

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 #Regular function
def add(x, y):
    return x + y

 #Lambda expression
add = lambda x, y: x + y
```

Key Characteristics and Use Cases

Single-line expressions.
Automatically return the value of the expression.
No need for a name, making them concise and functional

Common Use Case: *map, filter, reduce, sort*
map(function, iterable)
filter(function, iterable)
reduce(function, iterable)
sorted(iterable, key=function)
sorted(iterable, key=function, reverse=False)

Explanation of Binding Behavior

In nested lambdas, the outer function captures variables and passes them to the inner function.

- **Closures**:
  - The inner lambda "remembers" variables from the enclosing scope.

- **Illustration of Late Binding**:
  - Late binding means that variables in a lambda expression are looked up when the lambda is executed, not when it is defined.

Limitations and Best Practices

- Limitations:
  - Single expression: Cannot contain statements.
  - Limited readability for complex operations.
  - No docstrings or annotations.
- Best Practices:
  - Use for simple, short functions.
  - Avoid overly complex lambdas.
  - When readability is key, prefer named functions.

Real-World Applications:

- Data processing pipelines.
- Quick prototyping in scripts.
- Simplifying logic in larger programs.

תרגילון

You are given a list of Students ,where each Student is represented with their name, age, and a dictionary of grades in various subjects. The task is to implement several operations using Lambda expressions:

- **Sort the students** by their average grade in descending order.
- **Filter out students** who have an average grade below a certain threshold .