12 April 2024 – Class work

1. Write a Python program that demonstrates the use of the **nonlocal** keyword to modify a variable defined in the outer enclosing scope within a nested function.

2. Design a Python program consisting of multiple modules, each containing a function that prints its module's name using the **__name__** attribute. In the main script, import and execute these functions to understand how **__name__** differs in the main module and imported modules.

3. **Task:** Create a Python package named "DataAnalysis" that includes modules for basic data analysis operations such as mean, median, mode, and standard deviation calculation. The package should have the following structure:

```
DataAnalysis/
    ├── __init__.py
    ├── statistics/
    │   ├── __init__.py
    │   ├── mean.py
    │   ├── median.py
    │   ├── mode.py
    │   └── standard_deviation.py
    └── examples/
        └── analyze_data.py
```

1. **`mean.py`**: Contains a function to calculate the mean of a list of numbers.
2. **`median.py`**: Contains a function to calculate the median of a list of numbers.
3. **`mode.py`**: Contains a function to calculate the mode of a list of numbers.
4. **`standard_deviation.py`**: Contains a function to calculate the standard deviation of a list of numbers.
5. **`__init__.py`** files are empty, marking the directories as Python packages.
6. **`analyze_data.py`** under **`examples/`**: A script that demonstrates how to use functions from the **`statistics`** module to analyze a sample dataset.

Task Details:

- Each module should have a clear docstring explaining the purpose of the module and the function(s) it contains.
- The **`analyze_data.py`** script should import functions from the **`statistics`** module and perform data analysis on a sample dataset (you can create a sample dataset or use a pre-existing one).
- The script should showcase the usage of functions like mean, median, mode, and standard deviation to analyze the dataset and print out the results