Implementation of Functions and Lambda Function in python ¶

Objective:

1. Understand and Implement the function and lambda function
2. To create the function that calculates the carbon footprint based on energy consumption (in kilowatt-hours) and the emission factor (kg CO2 per kWh).
3. To create the lambda function to filter out cities where the carbon footprint is below a sustainability threshold (e.g., below 400 kg CO2).

1. Understanding and Implementing Functions

Functions: A function in Python is a reusable block of code that performs a specific task.

Example: A function to calculate the carbon footprint:

In [2]:
```
def calculate_carbon_footprint(energy_consumption, emission_factor):
    """
    This function calculates the carbon footprint based on energy consumptio
    (in kilowatt-hours) and the emission factor (in kg CO2 per kWh).
    """
    return energy_consumption * emission_factor
```

2. Implementation of the Carbon Footprint Calculation Function

Here's how the function works:

In [3]:
```
# Example usage:
energy_consumption = 1000  # in kWh
emission_factor = 0.475      # kg CO2 per kWh

carbon_footprint = calculate_carbon_footprint(energy_consumption, emission_f
print(f"Carbon Footprint: {carbon_footprint} kg CO2")

#This will calculate and print the carbon footprint for the given energy con
```

```
Carbon Footprint: 475.0 kg CO2
```

3. Lambda Function to Filter Cities Based on Carbon Footprint

Lamda functions: lambda functions are one-line functions in Python. A lambda function is a small, anonymous function you can use when you need a simple, short-term function.

Here's how you can use a lambda function to filter out cities with a carbon footprint below a sustainability threshold, for example, 400 tons CO_2 per month.

In [3]:
```
# List of cities with their carbon footprints in tons CO2 per month
cities = [
    {"name": "City A", "carbon_footprint": 500},
    {"name": "City B", "carbon_footprint": 350},
    {"name": "City C", "carbon_footprint": 600},
    {"name": "City D", "carbon_footprint": 200},
]

# Lambda function to filter cities below the threshold (400 ton CO2)
sustainability_threshold = 400
sustainable_cities = list(filter(lambda city: city["carbon_footprint"] < sus

# Printing the filtered list of sustainable cities
print("Sustainable Cities:")
for city in sustainable_cities:
    print(city["name"])
```

```
Sustainable Cities:
City B
City D
```

Points to remember:

Functions help you reuse code for specific tasks like calculating t
he carbon footprint.
Lambda Functions are useful when you need short, throwaway function
s, such as when filtering lists.