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### 3.2 Guided Practice Python Functions with AI

#### Question 1: What is a function in Python?

- **Syntax:** Defined with the `def` keyword, followed by the function name and parentheses.
- **Parameters:** Functions can accept inputs (arguments) to customize behavior.
- **Return values:** Functions can send back results using the `return` statement.
- **Indentation:** Code inside a function must be indented to indicate scope.
- **Calling:** Functions are executed by writing their name followed by parentheses.


Sources: Programiz +2

#### Example

```
Python ^  Copy

# Defining a function
def greet(name):
    return f"Hello, {name}!"

# Calling the function
print(greet("Alice"))
print(greet("Bob"))
```

 Output:

```
Code ^  Copy

Hello, Alice!
Hello, Bob!
```

Here:

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Question 2: How do you define a Python function named `add`, which adds two numbers together? It receives two parameters.

You can define a Python function named `add` that takes two parameters and returns their sum like this:

```
Python ^ Copy  
  
# Define the function  
def add(x, y):  
    return x + y  
  
# Example usage  
result = add(5, 3)  
print(result) # Output: 8
```

### Explanation

- `def add(x, y):` → Defines a function called `add` with two parameters (`x` and `y`).
- `return x + y` → Returns the sum of the two parameters.
- `add(5, 3)` → Calls the function with arguments `5` and `3`.
- `print(result)` → Displays the result (`8`).

This is a **user-defined function** that demonstrates how Python functions can accept inputs and produce outputs.

Would you like me to also show you how to write this same `add` function as a **lambda function** (a shorter, anonymous version)?

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Question 3: What happens when you call a function?

- **Execution jumps to the function:** Python transfers control to the block of code defined inside the function.
- **Arguments are passed in:** Any values you provide in the parentheses are assigned to the function's parameters.
- **Code inside runs:** The indented statements inside the function body execute in order.
- **Return value (if any):** If the function has a `return` statement, Python sends that value back to the caller. If not, it returns `None` by default.
- **Control returns to the caller:** After the function finishes, Python resumes execution at the point where the function was called.

## Example

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```
def add(x, y):  
    return x + y  
  
result = add(5, 3) # Function call  
print(result)
```

👉 Step-by-step:

1. `add(5, 3)` is called.
2. `x` becomes `5`, `y` becomes `3`.
3. Inside the function, `x + y` is computed → `8`.
4. `return 8` sends the result back.
5. `result` stores `8`.

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Question 4: What is the return statement in a Python function?

## Key Points About `return`

- **Ends function execution:** Once `return` is executed, the function stops running immediately.
- **Sends back a value:** The expression after `return` is passed back to the caller.
- **Optional:** If no `return` is used, the function automatically returns `None`.
- **Multiple returns:** A function can have multiple `return` statements, but only one is executed per call depending on conditions.
- **Return types:** Can return any Python object — numbers, strings, lists, dictionaries, even other functions.

## Example 1: Returning a Value

```
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def add(x, y):
    return x + y


result = add(5, 3)
print(result) # Output: 8
```

Here, `return x + y` sends the sum back to the caller.

## Example 2: Returning Nothing

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Question 5: How do you pass arguments to a function?

## 🔑 Ways to Pass Arguments

- **Positional arguments**

Values are matched to parameters in the order they are given.

```
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def greet(name, age):  
    print(f"Hello {name}, you are {age} years old.")  
  
greet("Alice", 25) # name="Alice", age=25
```

- **Keyword arguments**

You specify which parameter each value belongs to.

```
Python ^ Copy  
  
greet(age=30, name="Bob") # Explicitly matched
```

- **Default arguments**

Parameters can have default values if no argument is provided.

```
Python ^ Copy  
  
def greet(name, age=18):  
    print(f"Hello {name}, you are {age} years old.")  
  
greet("Charlie") # Uses default age=18
```

- **Variable-length arguments ( `*args` )**

Collects extra positional arguments into a tuple.

```
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```

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