

Lesson 04: Practical Application of AI-Powered Code Generation Tools

Overview

In this guided practice, you will build a simple number guessing game using Python and GitHub Copilot in VS Code. By the end, you will have a working game where the player tries to guess a randomly generated number within a set number of attempts.

Instructions

1. Work individually or in small groups to discuss your approach
2. Use VS Code with the GitHub Copilot extension to complete each task given below
3. Spend approximately 20 minutes completing all tasks
4. Document your observations and strategies in the worksheet provided for review

Tasks

Scenario: You are a junior developer at a game development startup, and your team has been tasked with creating a simple text-based game using Python. The goal is to design an interactive number guessing game where players must guess a randomly generated number within a limited number of attempts. Since you are using GitHub Copilot, you want to leverage AI-assisted coding to speed up development and ensure best practices in your code.

Your task is to develop the game in VS Code, utilizing inline comments and docstrings to guide Copilot in generating structured and optimized code.

Steps to be followed:

1. Set up the project
2. Generate a random number
3. Implement user input handling
4. Write the game logic
5. Test the game

Tools required: VS Code with GitHub Copilot

Dataset to be used: None

Discussion questions (optional)

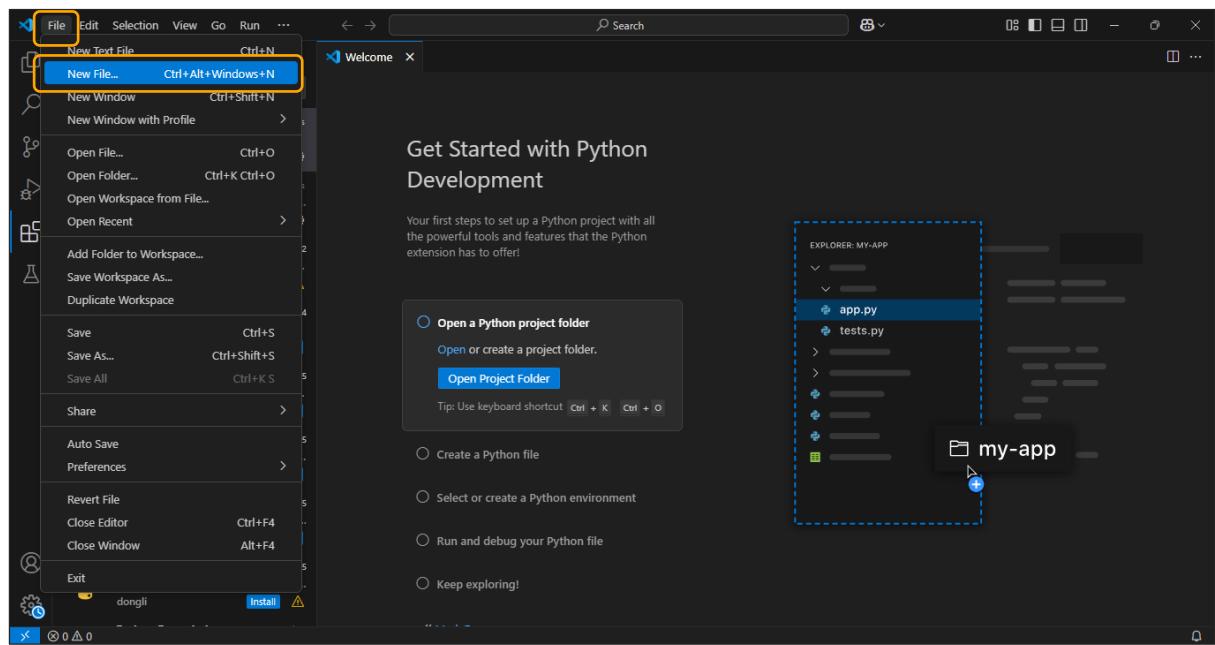
If time permits, discuss the following questions:

1. How did GitHub Copilot assist in generating the game logic, and what were its limitations?
2. Why is human oversight necessary when using AI-assisted coding tools like GitHub Copilot?

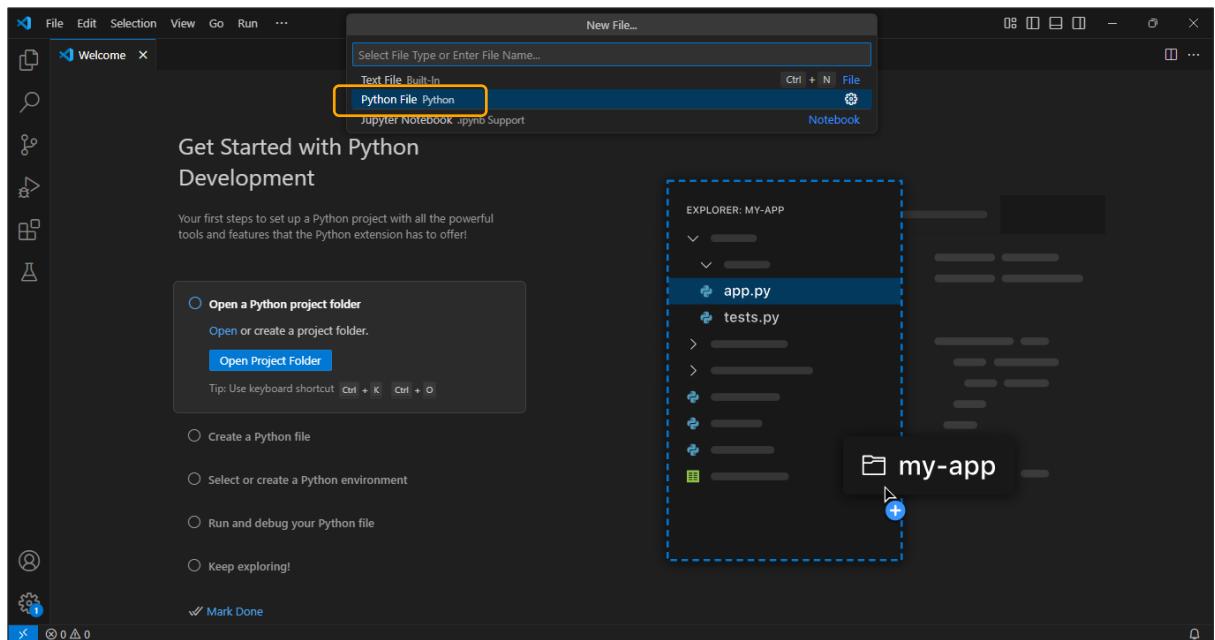
Answer Key

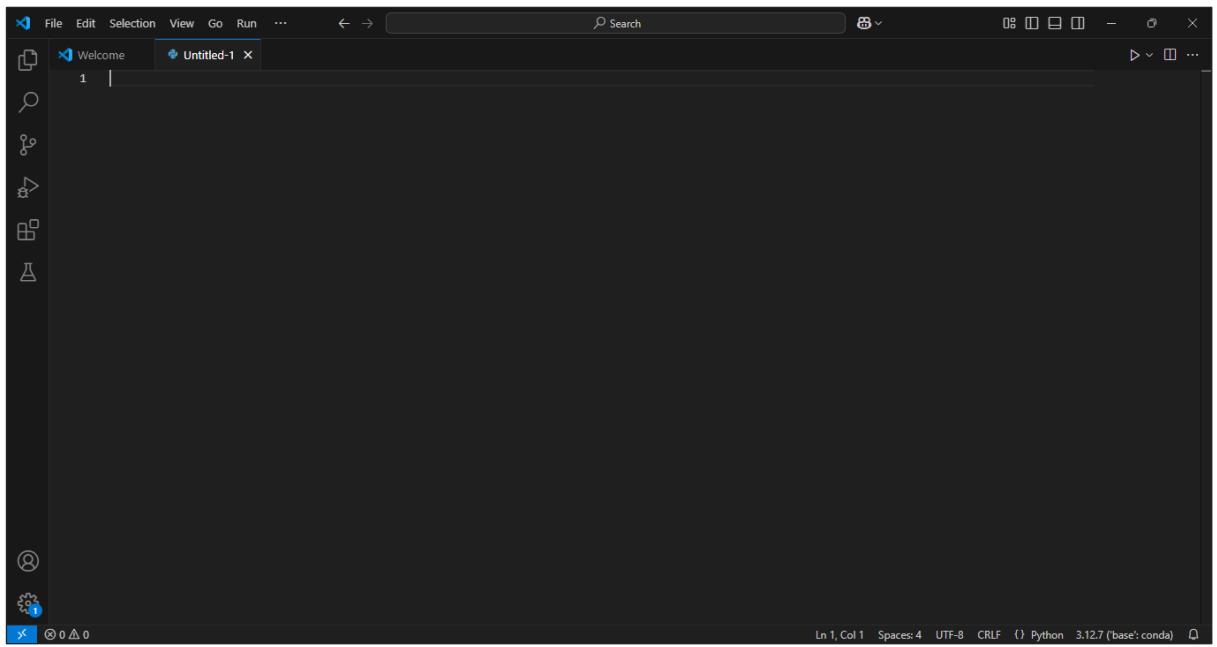
Step 1: Set up the project

1.1 Launch VS Code and click on **File** and then **New File**

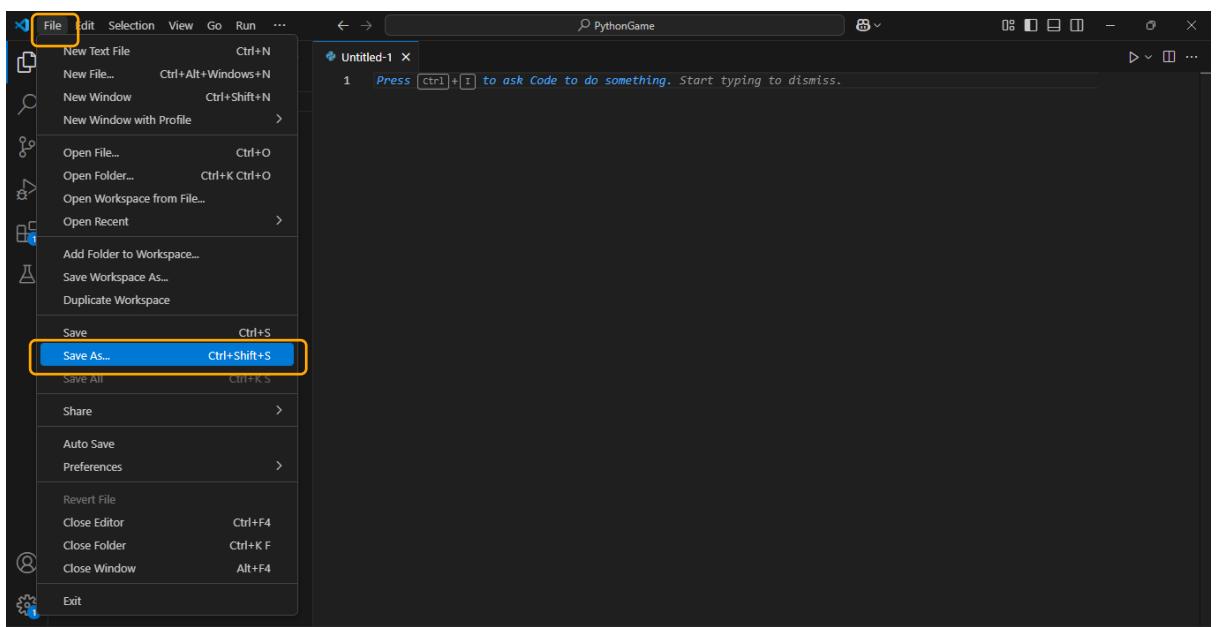


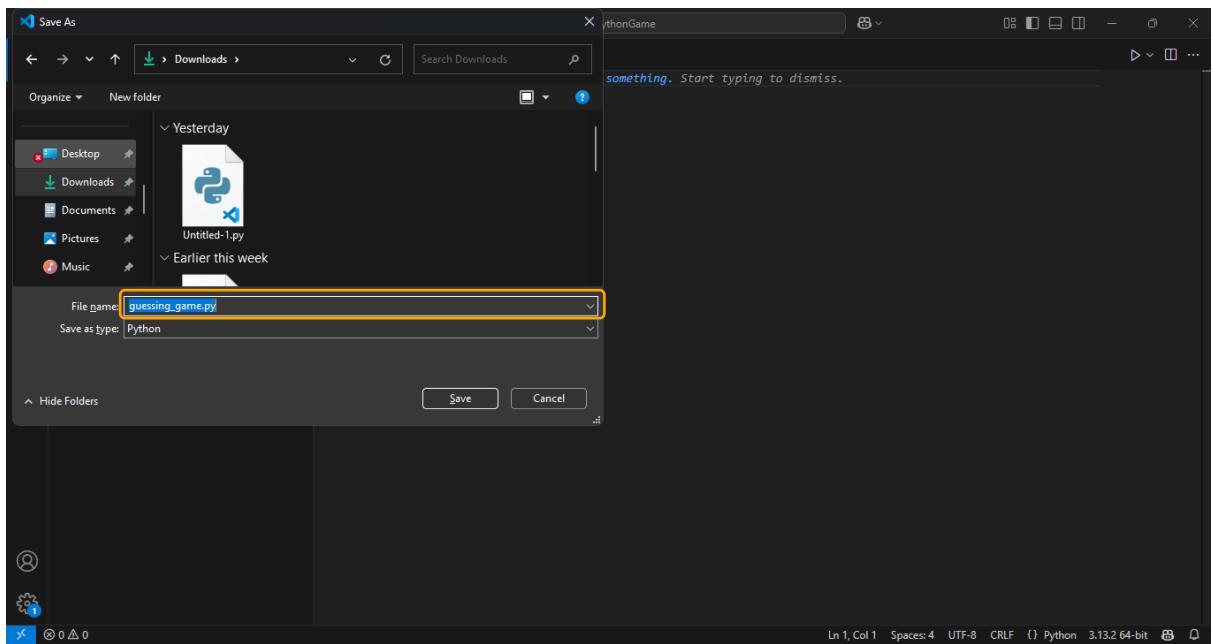
1.2 Select the **Python File** option from the name bar on top and a new Python file named Untitled-1 will open





1.3 Click on **File**. Select **Save As...** and rename the file to *guessing_game.py* before saving it to your preferred location





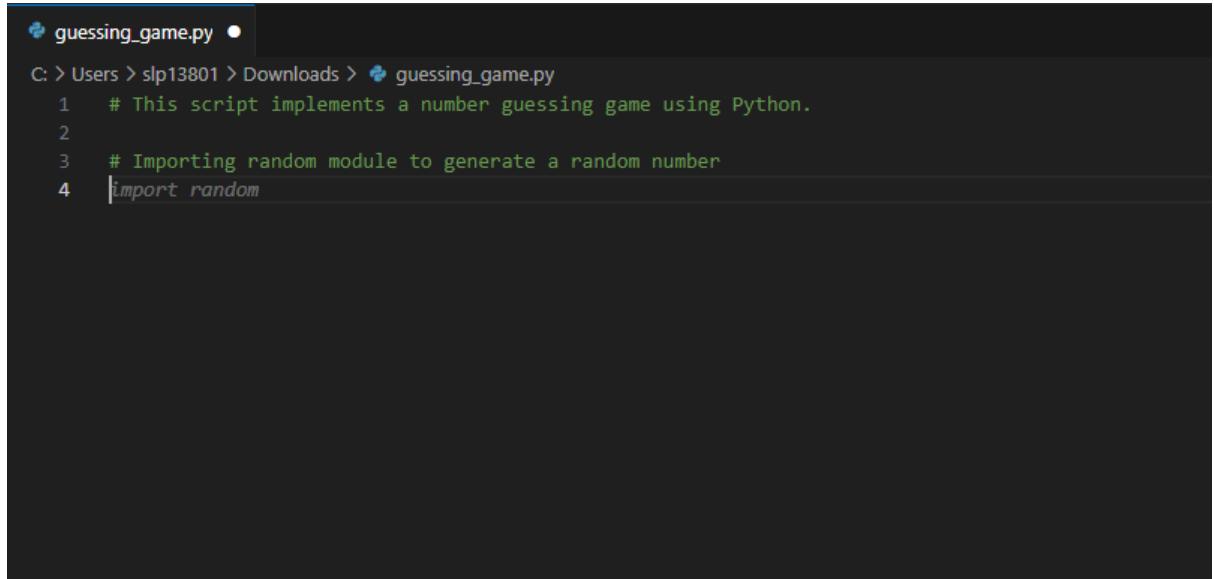
1.4 Type the following inline comment to guide Copilot:

```
# This script implements a number-guessing game using Python.
```

```
C: > Users > slp13801 > Downloads > guessing_game.py
1 # This script implements a number-guessing game using Python.
```

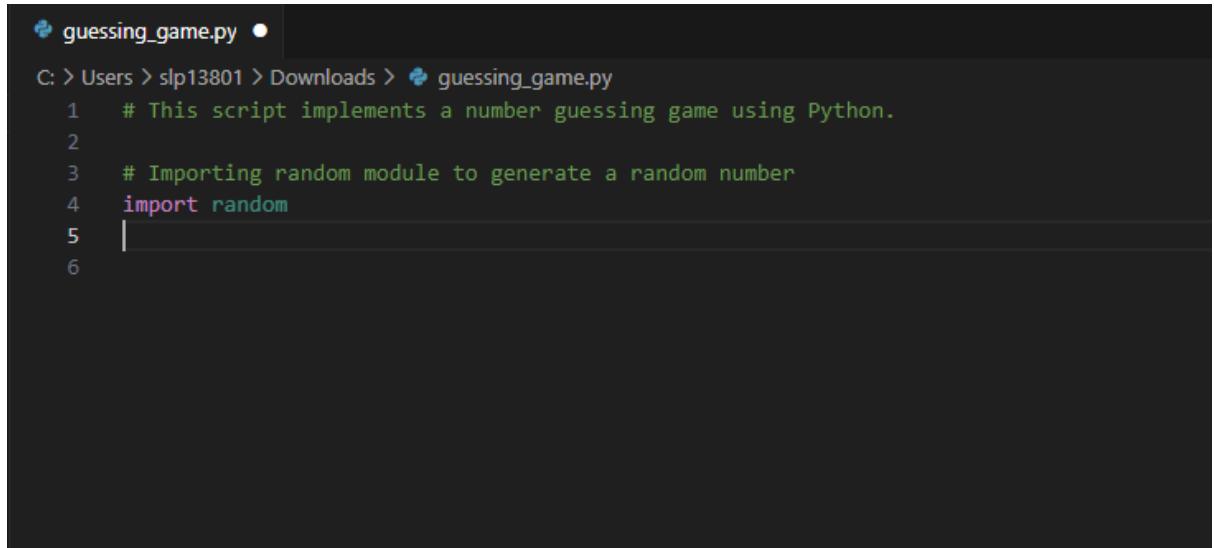
Step 2: Generate a random number

- 2.1 To import the random module, add an inline comment explaining why it's needed.
Then, press enter to get Copilot's suggestions.



```
guessing_game.py
C: > Users > slp13801 > Downloads > guessing_game.py
1 # This script implements a number guessing game using Python.
2
3 # Importing random module to generate a random number
4 import random
```

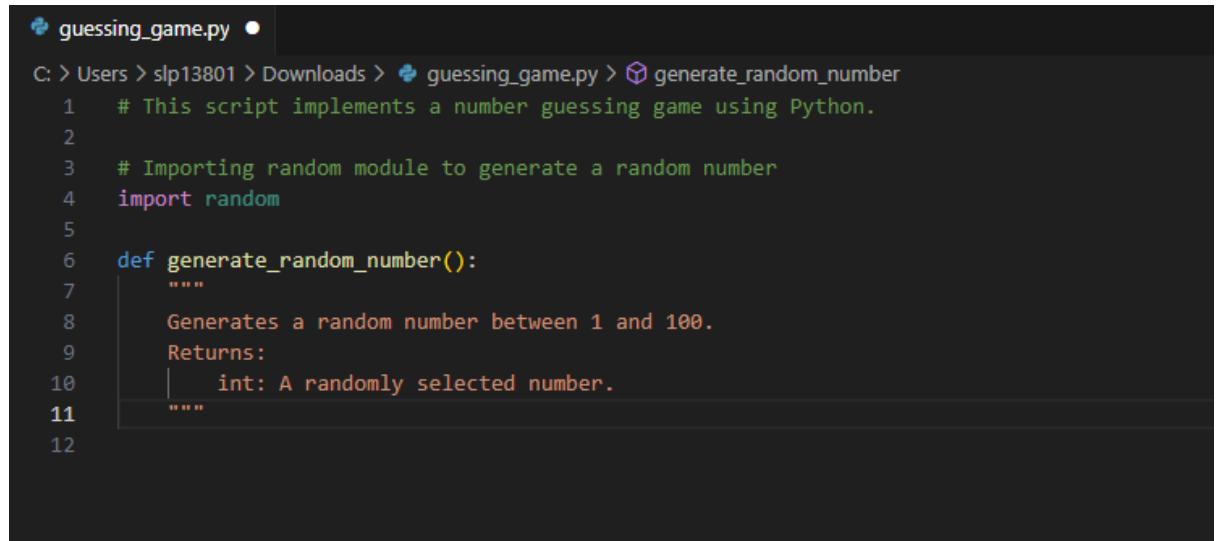
- 2.2 Observe Copilot's suggestions and press tab to accept them



```
guessing_game.py
C: > Users > slp13801 > Downloads > guessing_game.py
1 # This script implements a number guessing game using Python.
2
3 # Importing random module to generate a random number
4 import random
5
6
```

2.3 Write the following function with a docstring to guide Copilot in generating a random number:

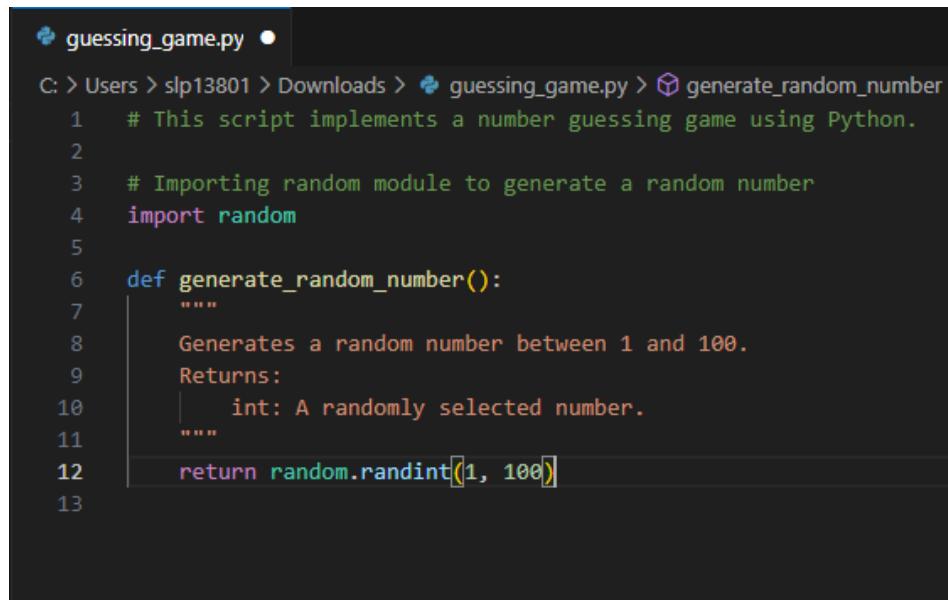
```
def generate_random_number():
    """
    Generates a random number between 1 and 100.
    Returns:
        int: A randomly selected number.
    """
```



The screenshot shows a code editor window with a dark theme. The file is named 'guessing_game.py'. The code defines a function 'generate_random_number' with a detailed docstring. The docstring includes a summary line ('Generates a random number between 1 and 100.'), a 'Returns:' section, and a return type ('int: A randomly selected number.'). The code editor highlights the function definition and the docstring text.

```
C: > Users > slp13801 > Downloads > guessing_game.py > generate_random_number
1   # This script implements a number guessing game using Python.
2
3   # Importing random module to generate a random number
4   import random
5
6   def generate_random_number():
7       """
8           Generates a random number between 1 and 100.
9           Returns:
10              int: A randomly selected number.
11      """
12
```

2.4 Press enter, observe Copilot's suggestions, and press tab to accept them



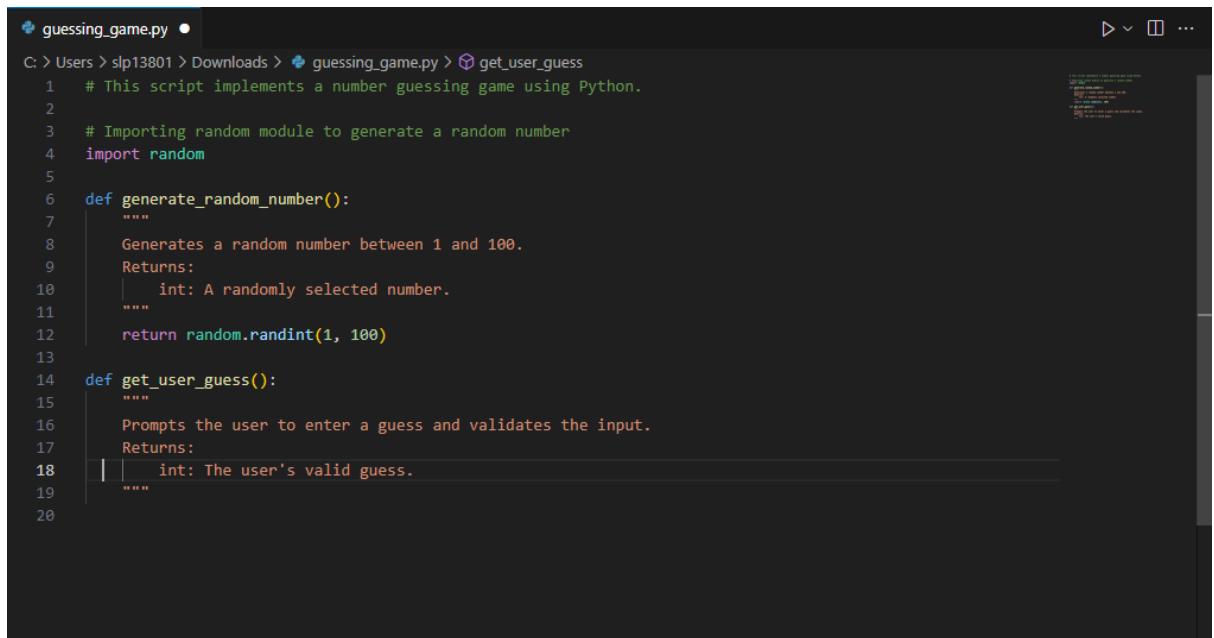
The screenshot shows the same code editor window after the user has accepted Copilot's suggestion. The function now includes a 'return' statement at the end, which generates a random integer between 1 and 100 using the 'random.randint' function.

```
C: > Users > slp13801 > Downloads > guessing_game.py > generate_random_number
1   # This script implements a number guessing game using Python.
2
3   # Importing random module to generate a random number
4   import random
5
6   def generate_random_number():
7       """
8           Generates a random number between 1 and 100.
9           Returns:
10              int: A randomly selected number.
11      """
12      return random.randint(1, 100)
13
```

Step 3: Implement user input handling

3.1 Define the following function with a docstring to take user input and validate it:

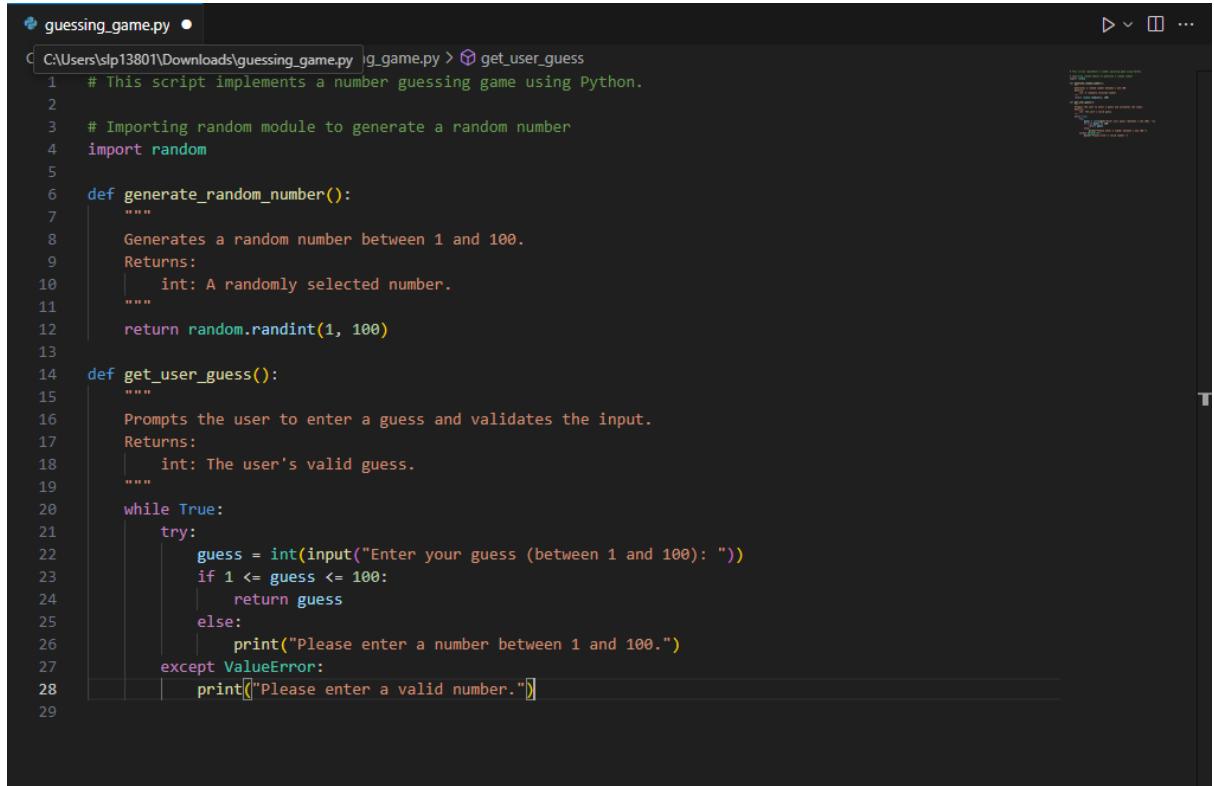
```
def get_user_guess():
    """
    Prompts the user to enter a guess and validates the input.
    Returns:
        int: The user's valid guess.
    """
```



The screenshot shows a code editor window with a dark theme. The file is named 'guessing_game.py'. The code implements a number guessing game using the 'random' module. It defines two functions: 'generate_random_number()' and 'get_user_guess()'. Both functions include detailed docstrings with descriptions, return types, and parameter details.

```
C:\> Users > slp13801 > Downloads > guessing_game.py > get_user_guess
1  # This script implements a number guessing game using Python.
2
3  # Importing random module to generate a random number
4  import random
5
6  def generate_random_number():
7      """
8          Generates a random number between 1 and 100.
9          Returns:
10             int: A randomly selected number.
11      """
12      return random.randint(1, 100)
13
14  def get_user_guess():
15      """
16          Prompts the user to enter a guess and validates the input.
17          Returns:
18              int: The user's valid guess.
19      """
20
```

3.2 Press enter, observe Copilot's suggestions, and press tab to accept them



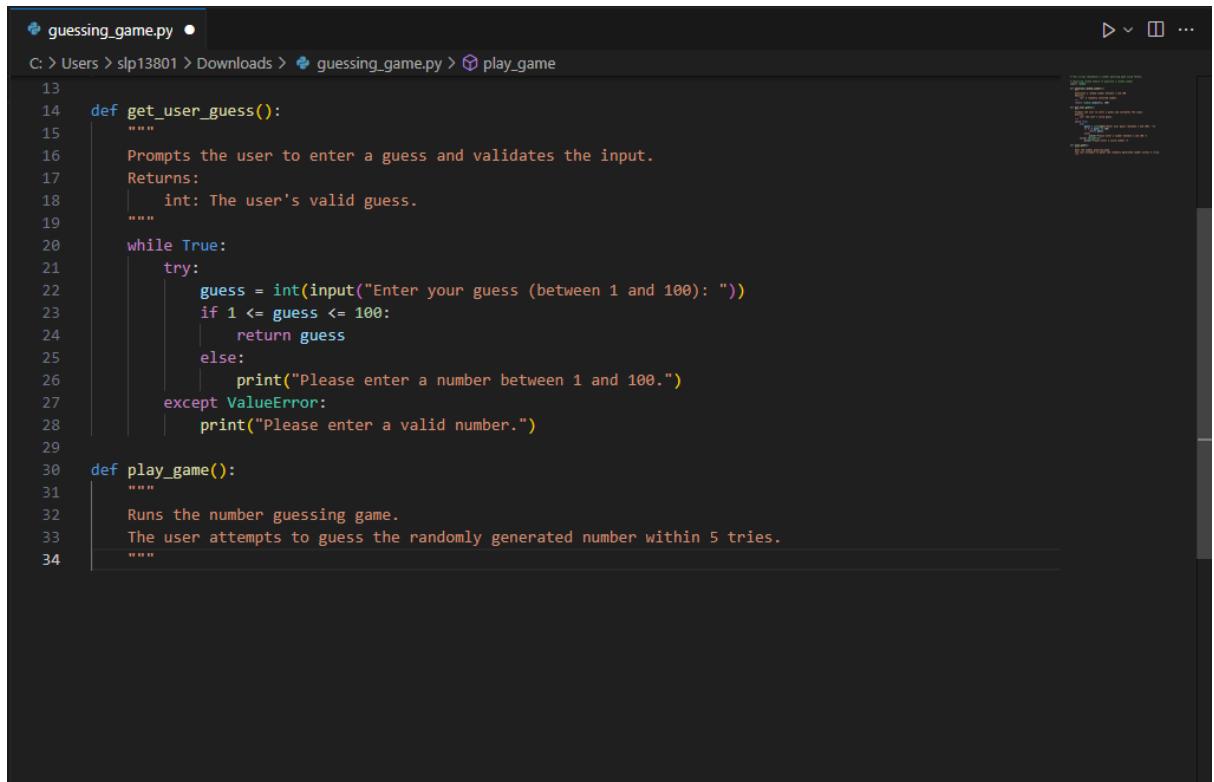
The screenshot shows a code editor window with a dark theme. The file is named 'guessing_game.py'. The code implements a simple number guessing game using the 'random' module. It defines two functions: 'generate_random_number()' and 'get_user_guess()'. The 'generate_random_number()' function generates a random integer between 1 and 100. The 'get_user_guess()' function prompts the user for input, validates it, and returns an integer. A try-except block handles ValueError exceptions. The code includes docstrings for both functions.

```
guessing_game.py
C:\Users\slp13801\Downloads\guessing_game.py | g_game.py > get_user_guess
1  # This script implements a number guessing game using Python.
2
3  # Importing random module to generate a random number
4  import random
5
6  def generate_random_number():
7      """
8          Generates a random number between 1 and 100.
9          Returns:
10             int: A randomly selected number.
11      """
12      return random.randint(1, 100)
13
14  def get_user_guess():
15      """
16          Prompts the user to enter a guess and validates the input.
17          Returns:
18             int: The user's valid guess.
19      """
20      while True:
21          try:
22              guess = int(input("Enter your guess (between 1 and 100): "))
23              if 1 <= guess <= 100:
24                  return guess
25              else:
26                  print("Please enter a number between 1 and 100.")
27          except ValueError:
28              print("Please enter a valid number.")
```

Step 4: Write the game logic

4.1 Define the following main game function and explain its logic with a docstring:

```
def play_game():
    """
    Runs the number guessing game.
    The user attempts to guess the randomly generated number within 5 tries.
    """
```

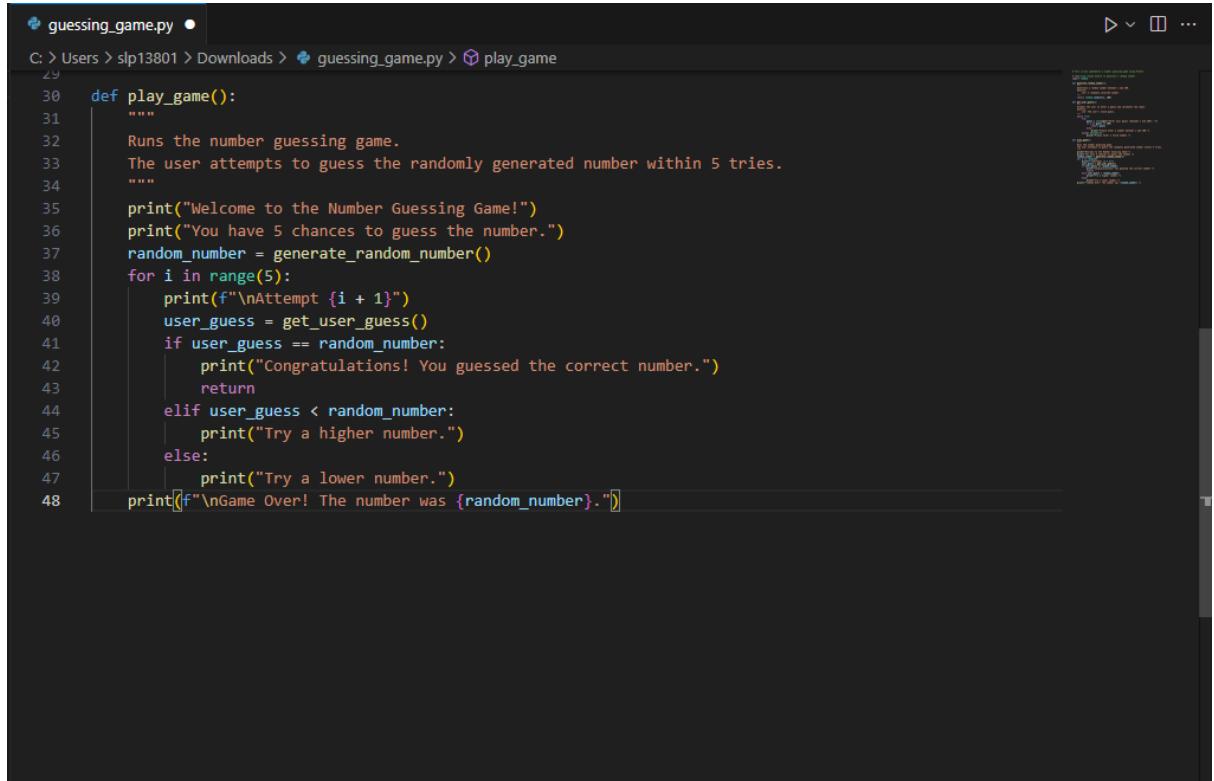


```
guessing_game.py
C: > Users > slp13801 > Downloads > guessing_game.py > play_game

13
14     def get_user_guess():
15         """
16             Prompts the user to enter a guess and validates the input.
17             Returns:
18                 int: The user's valid guess.
19         """
20
21     while True:
22         try:
23             guess = int(input("Enter your guess (between 1 and 100): "))
24             if 1 <= guess <= 100:
25                 return guess
26             else:
27                 print("Please enter a number between 1 and 100.")
28         except ValueError:
29             print("Please enter a valid number.")

30 def play_game():
31     """
32         Runs the number guessing game.
33         The user attempts to guess the randomly generated number within 5 tries.
34     """
```

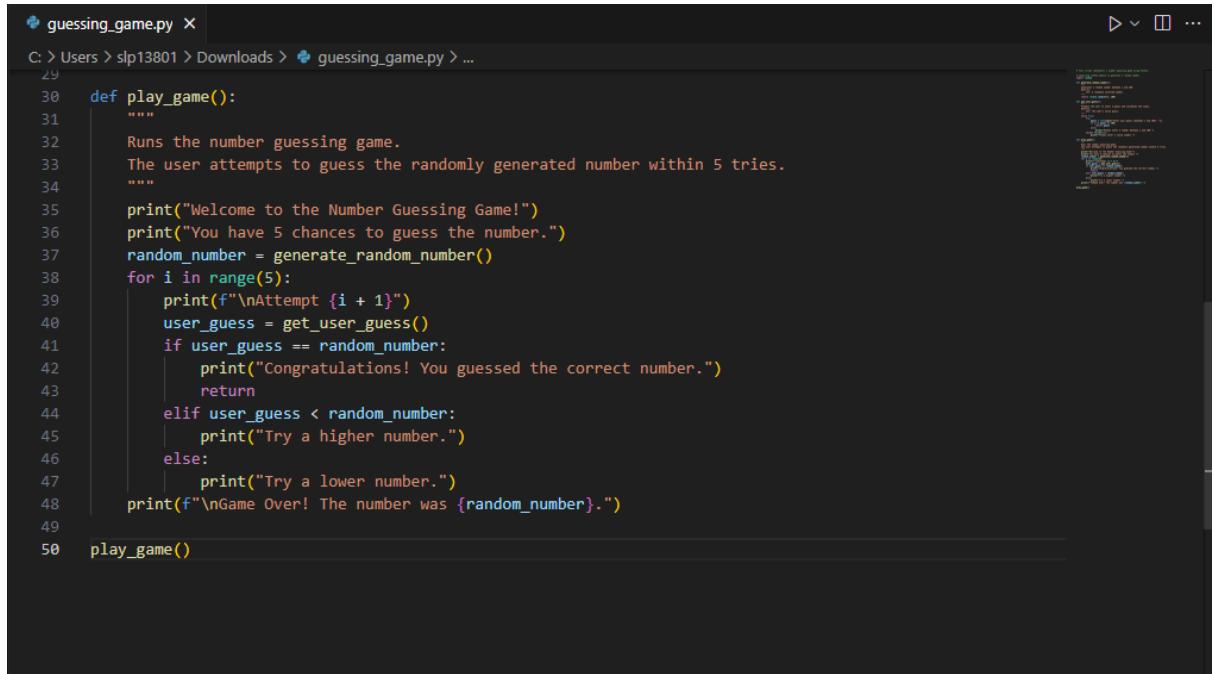
4.2 Press enter, observe Copilot's suggestions, and press tab to accept them



```
guessing_game.py •
C: > Users > slp13801 > Downloads > guessing_game.py > play_game
29
30 def play_game():
31     """
32     Runs the number guessing game.
33     The user attempts to guess the randomly generated number within 5 tries.
34     """
35     print("Welcome to the Number Guessing Game!")
36     print("You have 5 chances to guess the number.")
37     random_number = generate_random_number()
38     for i in range(5):
39         print(f"\nAttempt {i + 1}")
40         user_guess = get_user_guess()
41         if user_guess == random_number:
42             print("Congratulations! You guessed the correct number.")
43             return
44         elif user_guess < random_number:
45             print("Try a higher number.")
46         else:
47             print("Try a lower number.")
48     print(f"\nGame Over! The number was {random_number}.")
```

4.3 Create a call to the function to test the logic using the following syntax:

play_game()



```
guessing_game.py X
C: > Users > slp13801 > Downloads > guessing_game.py > ...
29
30 def play_game():
31     """
32     Runs the number guessing game.
33     The user attempts to guess the randomly generated number within 5 tries.
34     """
35     print("Welcome to the Number Guessing Game!")
36     print("You have 5 chances to guess the number.")
37     random_number = generate_random_number()
38     for i in range(5):
39         print(f"\nAttempt {i + 1}")
40         user_guess = get_user_guess()
41         if user_guess == random_number:
42             print("Congratulations! You guessed the correct number.")
43             return
44         elif user_guess < random_number:
45             print("Try a higher number.")
46         else:
47             print("Try a lower number.")
48     print(f"\nGame Over! The number was {random_number}.")
49
50 play_game()
```

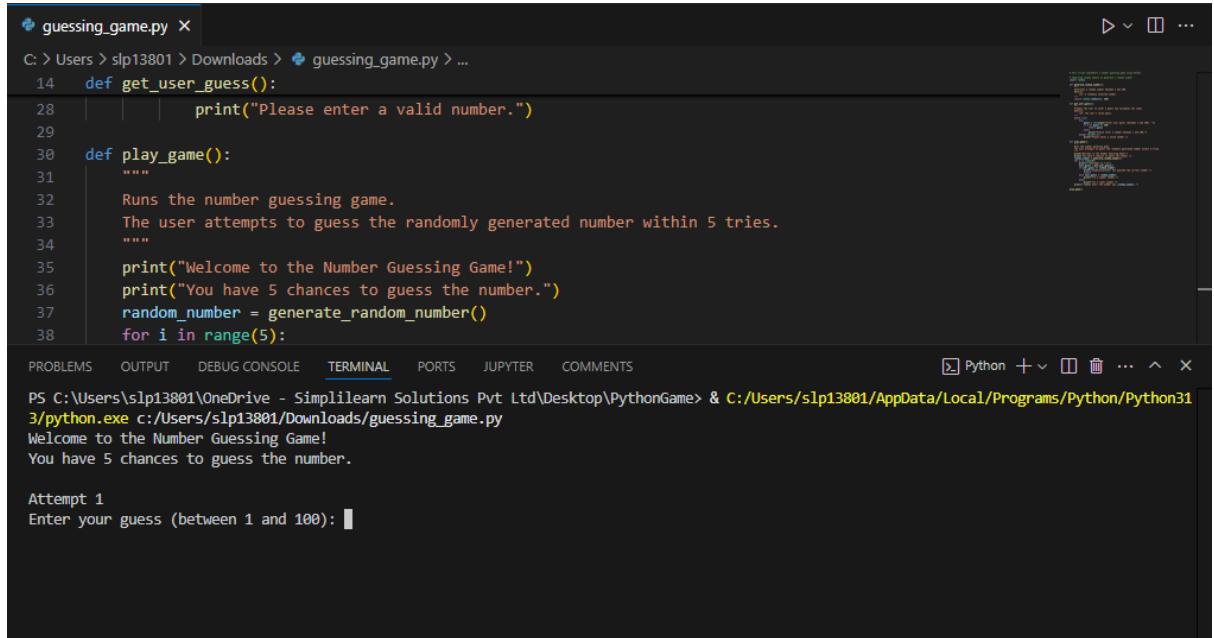
Step 5: Test the game

5.1 Click the play button on the top-right corner to run the Python file



```
guessing_game.py x
C: > Users > slp13801 > Downloads > guessing_game.py > ...
14 def get_user_guess():
15     try:
16         user_guess = int(input("Please enter a valid number."))
17     except ValueError:
18         print("Please enter a valid number.")
19
20 def play_game():
21     """
22     Runs the number guessing game.
23     The user attempts to guess the randomly generated number within 5 tries.
24     """
25     print("Welcome to the Number Guessing Game!")
26     print("You have 5 chances to guess the number.")
27     random_number = generate_random_number()
28     for i in range(5):
29         print(f"\nAttempt {i + 1}")
30         user_guess = get_user_guess()
31         if user_guess == random_number:
32             print("Congratulations! You guessed the correct number.")
33             return
34         elif user_guess < random_number:
35             print("Try a higher number.")
36         else:
37             print("Try a lower number.")
38     print("\nGame Over! The number was {random_number}.")
39
40 play_game()
```

The following output is generated after running the file:



```
guessing_game.py x
C: > Users > slp13801 > Downloads > guessing_game.py > ...
14 def get_user_guess():
15     try:
16         user_guess = int(input("Please enter a valid number."))
17     except ValueError:
18         print("Please enter a valid number.")
19
20 def play_game():
21     """
22     Runs the number guessing game.
23     The user attempts to guess the randomly generated number within 5 tries.
24     """
25     print("Welcome to the Number Guessing Game!")
26     print("You have 5 chances to guess the number.")
27     random_number = generate_random_number()
28     for i in range(5):
29         print(f"\nAttempt {i + 1}")
30         user_guess = get_user_guess()
31         if user_guess == random_number:
32             print("Congratulations! You guessed the correct number.")
33             return
34         elif user_guess < random_number:
35             print("Try a higher number.")
36         else:
37             print("Try a lower number.")
38     print("\nGame Over! The number was {random_number}.")
39
40 play_game()

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS JUPYTER COMMENTS
PS C:\Users\slp13801\OneDrive - Simplilearn Solutions Pvt Ltd\Desktop\PythonGame> & C:/Users/slp13801/AppData/Local/Programs/Python/Python31
3/python.exe c:/Users/slp13801/Downloads/guessing_game.py
Welcome to the Number Guessing Game!
You have 5 chances to guess the number.

Attempt 1
Enter your guess (between 1 and 100): 
```

```
guessing_game.py X
C:\Users\slp13801\Downloads> guessing_game.py ...
14 def get_user_guess():
28     print("Please enter a valid number.")
29
30 def play_game():
31     """
32         Runs the number guessing game.
33         The user attempts to guess the randomly generated number within 5 tries.
34     """
35     print("Welcome to the Number Guessing Game!")
36     print("You have 5 chances to guess the number.")

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS JUPYTER COMMENTS
```

Attempt 1
Enter your guess (between 1 and 100): 27
Try a higher number.

Attempt 2
Enter your guess (between 1 and 100): 55
Try a higher number.

Attempt 3
Enter your guess (between 1 and 100): 99
Try a lower number.

Attempt 4
Enter your guess (between 1 and 100): 87
Try a lower number.

Attempt 5
Enter your guess (between 1 and 100): 77
Try a lower number.

Game Over! The number was 61.

By following these steps, you have successfully built a number guessing game using Python and GitHub Copilot in VS Code. You learned how to use inline comments and docstrings to guide Copilot in generating structured and efficient code. Additionally, you explored how Copilot assists in writing game logic, handling user input, and managing game conditions. This practice reinforces the importance of AI-assisted coding while ensuring human oversight for accuracy and optimization. You can further enhance the game by adding difficulty levels, score tracking, or additional game mechanics.

Discussion questions (optional)

If time permits, discuss the following questions:

1. How did GitHub Copilot assist in generating the game logic, and what were its limitations?

Answer: GitHub Copilot provided quick code suggestions based on inline comments and docstrings, helping to structure the game efficiently. However, it was limited in understanding specific game logic requirements, requiring adjustments and testing to refine the functionality.

2. Why is human oversight necessary when using AI-assisted coding tools like GitHub Copilot?

Answer: AI-assisted tools generate code based on patterns and existing data but lack a true understanding of specific project goals. Human oversight is essential to verify logic, optimize performance, and ensure the final code meets functional requirements without unnecessary errors.