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FURTHER READING-

FUNCTIONS IN PYTHON

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THIS LECTURE WILL COVER…

- What is a function?
- Defining a Python function
- Function parameters & arguments
- Scope
- Returning values
- Example: Write a function to return the Fahrenheit value of a Celsius temperature number.
- Example 2: Write a Python function that compares two input Strings and returns True if they are identical or False if they are not identical.

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WHAT IS A FUNCTION?

A function is a unit of code that is often defined by its role within a greater code structure. Specifically, a function contains a unit of code that works on various inputs, many of which are variables, and produces concrete results involving changes to variable values or actual operations based on the inputs. *(techopedia, 2023)*

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A function is a block of organized, reusable code that is used to perform a single, related action. Functions provide better modularity for your application and a high degree of code reusing.
(tutorialspoint, 2023)

HOW TO DEFINE A PYTHON FUNCTION

365 Data Science, “Defining a function in Python,” 4, December 2020. [Online]. Available: https://www.youtube.com/watch?v=n9aDBOycsCY . [Accessed September 11, 2023].

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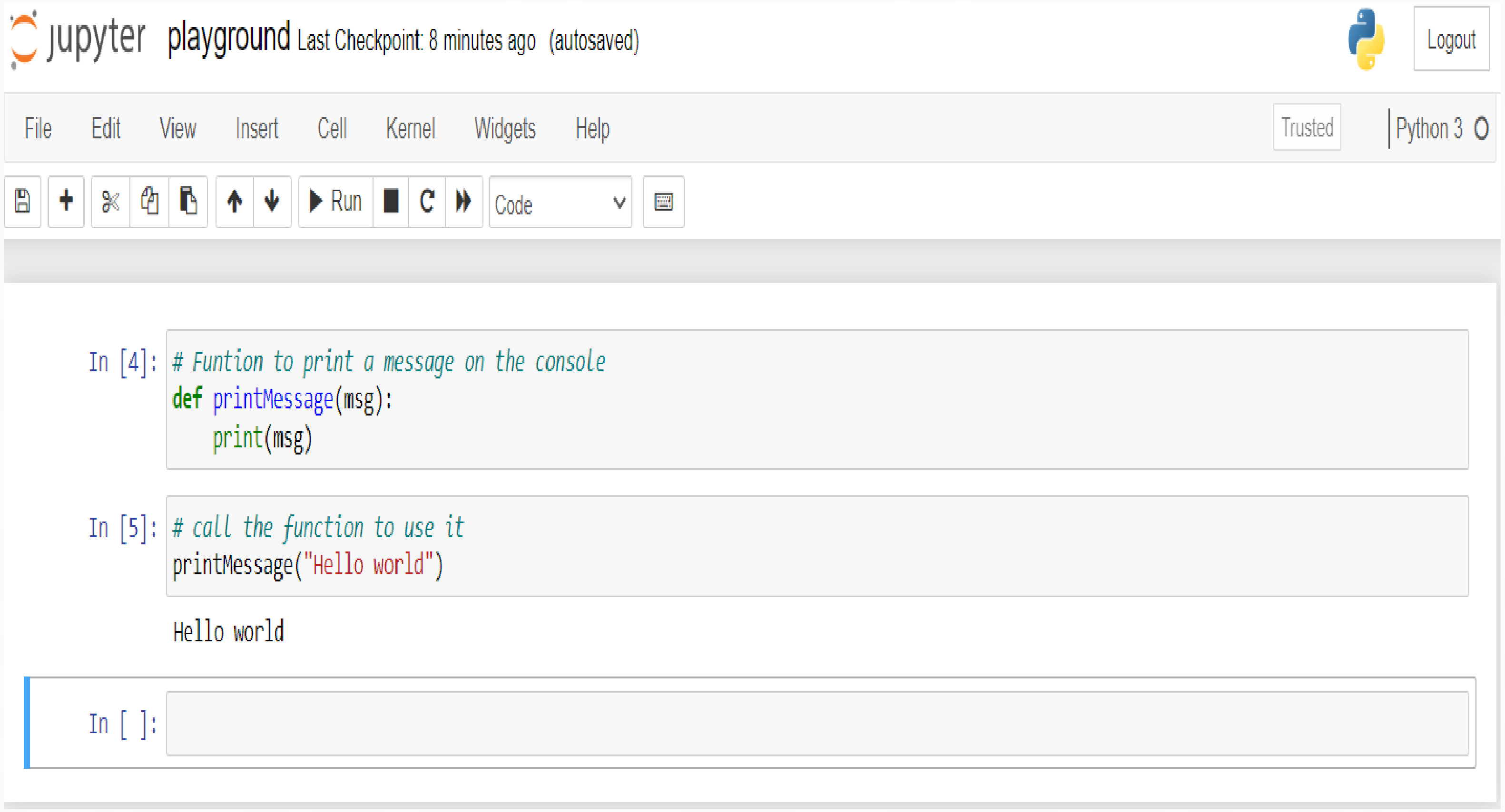
HOW TO DEFINE A PYTHON FUNCTION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Run
Code

In [4]:
```
# Funtion to print a message on the console
def printMessage(msg):
    print(msg)
```

In [5]:
```
# call the function to use it
printMessage("Hello world")
```

```
Hello world
```

In [ ]:

HOW TO DEFINE A PYTHON FUNCTION

- ❑ Start with the keyword ***'def'.***
- ❑ After the keyword *'def'* write the **name of your function.**
- ❑ Use brackets for writing the **function parameters** or leave them empty for no function parameters.
- ❑ Type in the next line the ***main body*** of the function i.e. the *code* of *what the function does.*
- ❑ To use then the function you defined, you need to ***call it*** i.e. type the name of the function with its arguments (if any).

FUNCTION PARAMETERS

- ❑ To make better use of a function you need to include *parameters* when defining it.
- ❑ Create the function’s parameters by writing them inside the brackets next to the name of the function.
- ❑ No need to specify the data type of the function parameters.
- ❑ You can have **none, one or many parameters** for a function.

FUNCTION ARGUMENTS

- To use a function you need to **call it by giving values to its parameters.**
- ***Pass arguments to the function***.

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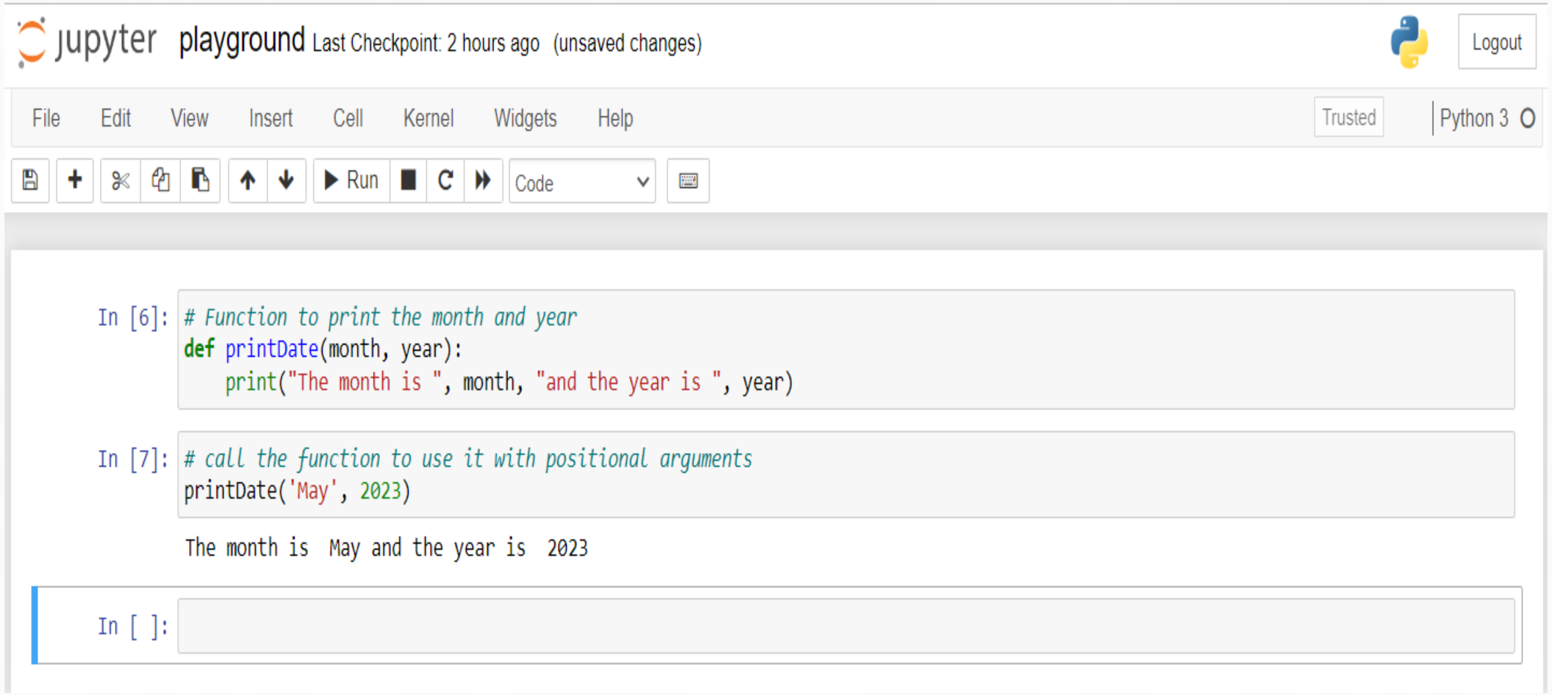
FUNCTION ARGUMENTS – **POSITIONAL**

- ❑ User provides the values for the parameters directly.
- ❑ Need to remember the order in which the positional arguments are passed to the function.



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```
In [6]: # Function to print the month and year
        def printDate(month, year):
            print("The month is ", month, "and the year is ", year)

In [7]: # call the function to use it with positional arguments
        printDate('May', 2023)

        The month is  May and the year is  2023

In [ ]:
```

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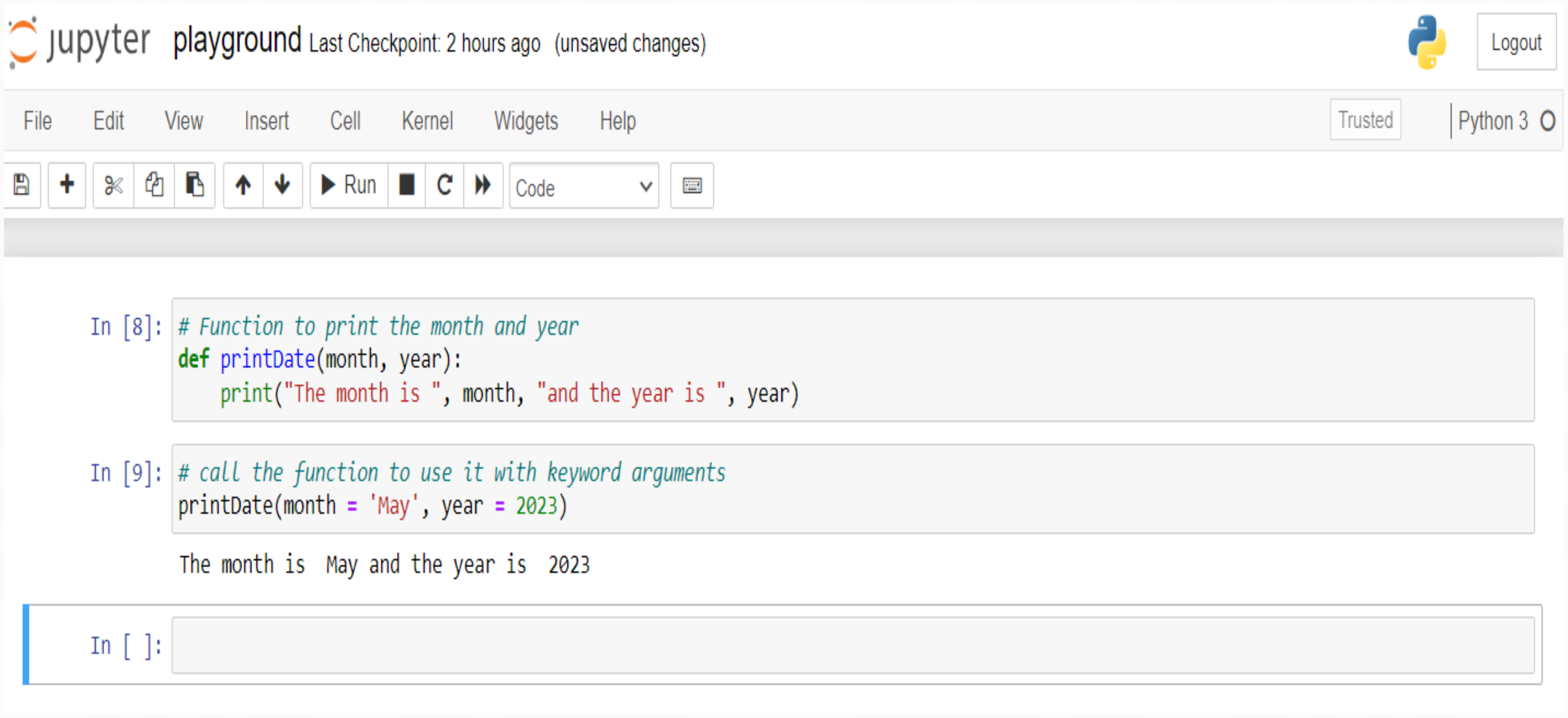
FUNCTION ARGUMENTS – KEYWORD

- Pass arguments using the format:

  parameterName = value



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```
In [8]: # Function to print the month and year
        def printDate(month, year):
            print("The month is ", month, "and the year is ", year)

In [9]: # call the function to use it with keyword arguments
        printDate(month = 'May', year = 2023)

        The month is  May and the year is  2023

In [ ]:
```

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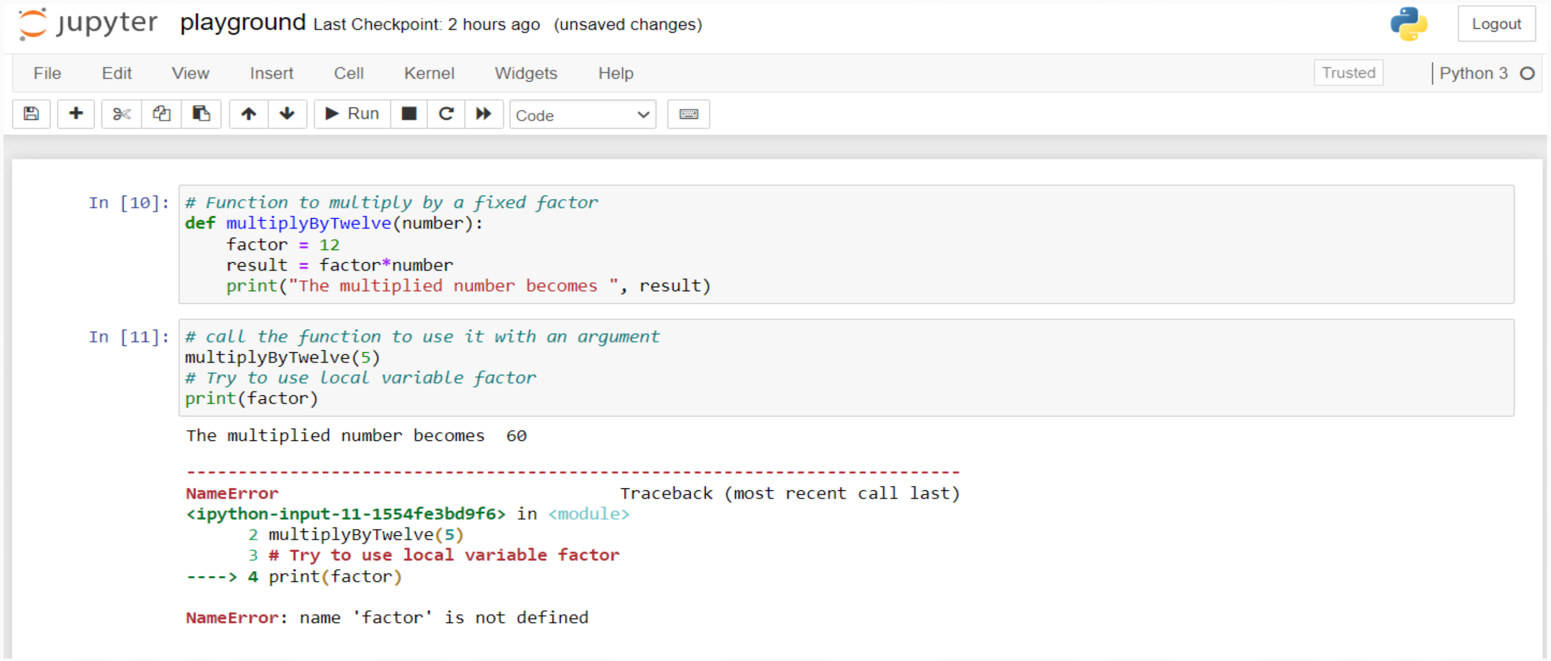
SCOPE IN FUNCTIONS

- ❑ Functions have *local* and *global* scope.
- ❑ *Local* variables used by one function cannot be called by another function's body.
- ❑ ***Local* scope variables cannot be used in a *global* scope.**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```
In [10]: # Function to multiply by a fixed factor
         def multiplyByTwelve(number):
             factor = 12
             result = factor*number
             print("The multiplied number becomes ", result)

In [11]: # call the function to use it with an argument
         multiplyByTwelve(5)
         # Try to use local variable factor
         print(factor)

         The multiplied number becomes  60

         ---------------------------------------------------------------------------
         NameError                                 Traceback (most recent call last)
         <ipython-input-11-1554fe3bd9f6> in <module>
               2 multiplyByTwelve(5)
               3 # Try to use local variable factor
         ----> 4 print(factor)

         NameError: name 'factor' is not defined
```

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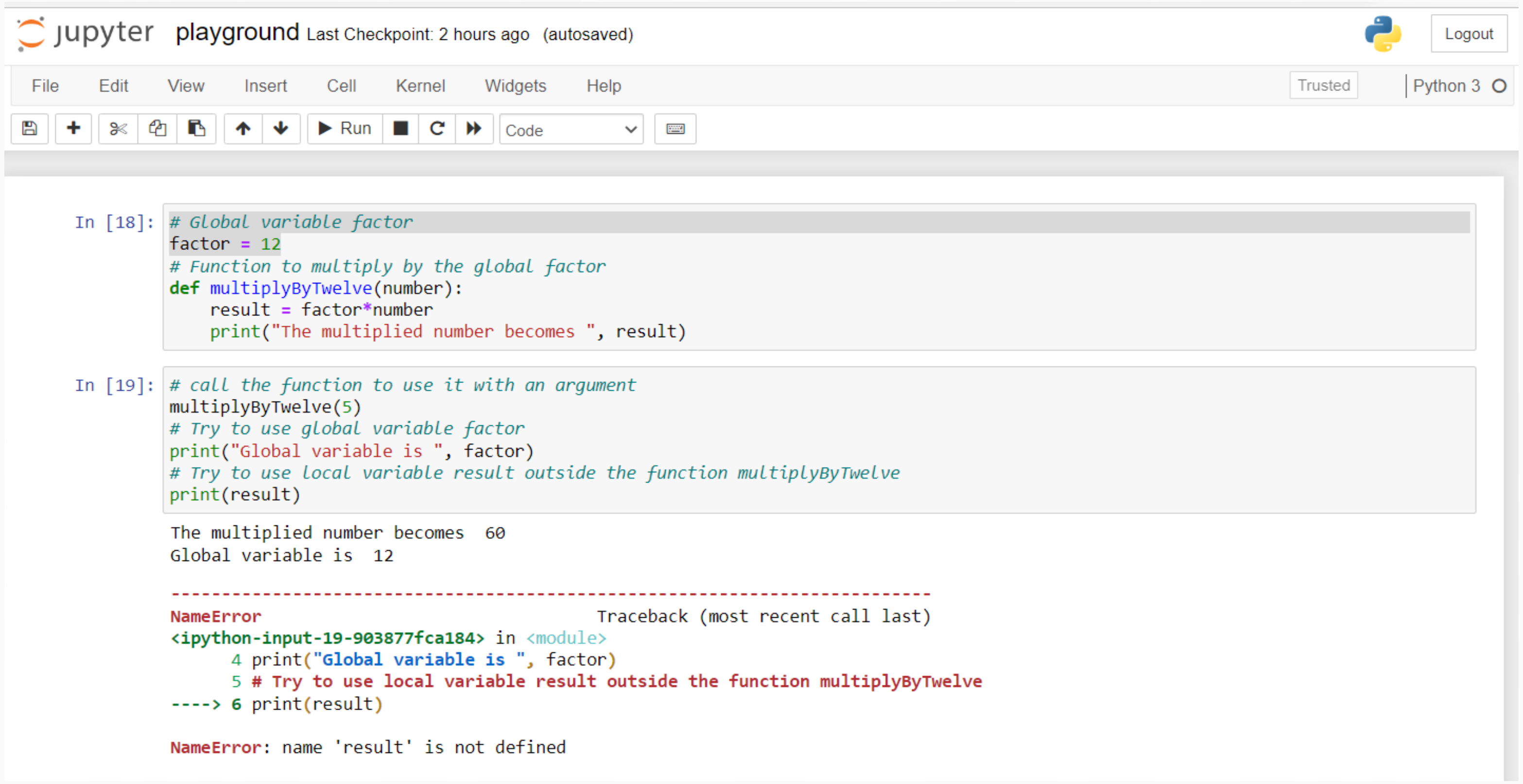
SCOPE IN FUNCTIONS

❑ ***Global* variables can be used locally by all functions.**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```
In [18]: # Global variable factor
         factor = 12
         # Function to multiply by the global factor
         def multiplyByTwelve(number):
             result = factor*number
             print("The multiplied number becomes ", result)

In [19]: # call the function to use it with an argument
         multiplyByTwelve(5)
         # Try to use global variable factor
         print("Global variable is ", factor)
         # Try to use local variable result outside the function multiplyByTwelve
         print(result)

         The multiplied number becomes  60
         Global variable is  12

         ---------------------------------------------------------------------------
         NameError                                 Traceback (most recent call last)
         <ipython-input-19-903877fca184> in <module>
               4 print("Global variable is ", factor)
               5 # Try to use local variable result outside the function multiplyByTwelve
         ----> 6 print(result)

         NameError: name 'result' is not defined
```

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FUNCTION RETURN

- ❑ A function does not need to always display its output directly.
- ❑ Instead, it can for example process some data and then return a value or set of values.
- ❑ The value that the function returns is called a *return value.*

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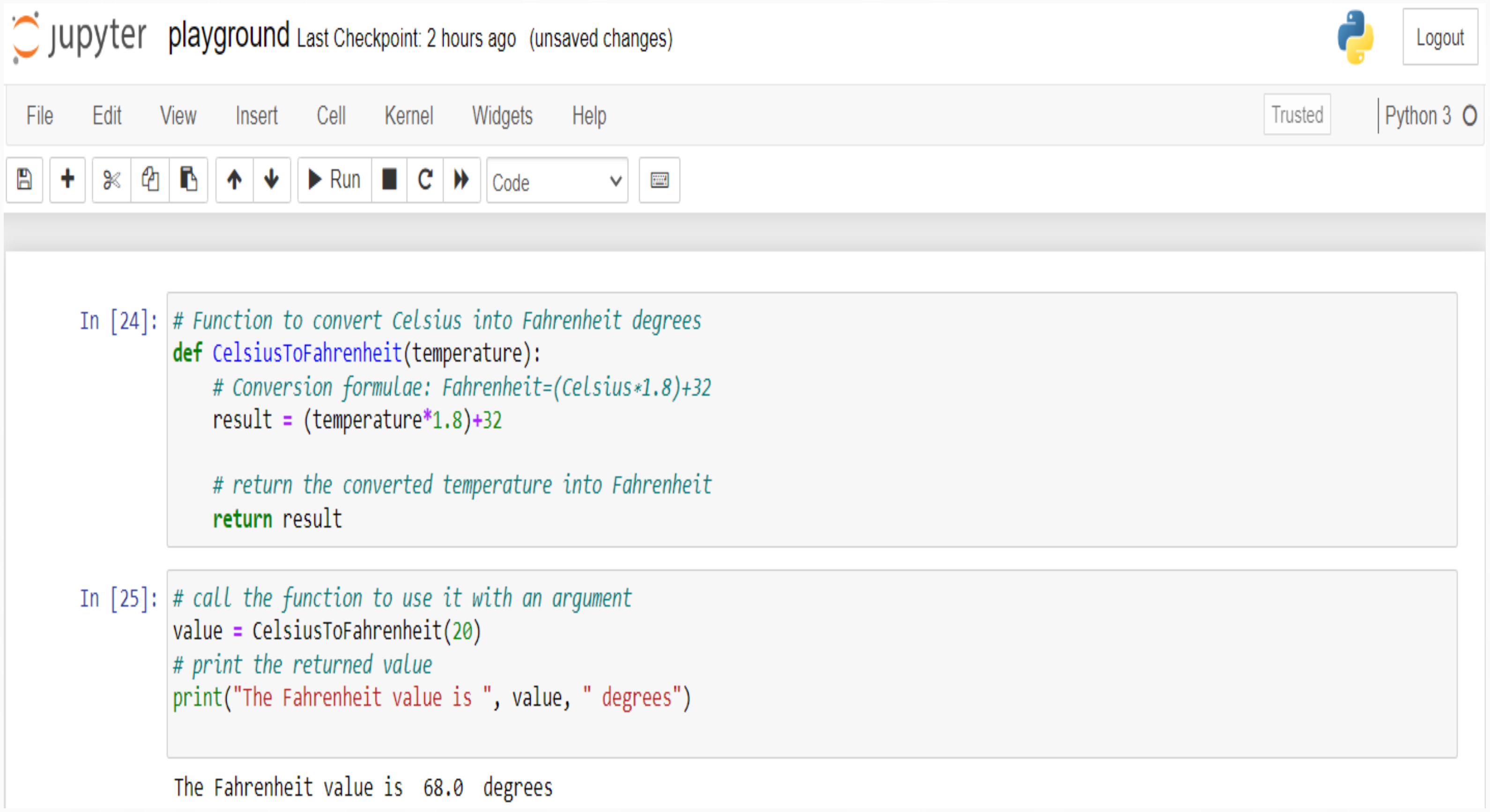
EXAMPLE:

WRITE A FUNCTION TO RETURN THE FAHRENHEIT VALUE OF A CELSIUS TEMPERATURE NUMBER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```
In [24]: # Function to convert Celsius into Fahrenheit degrees
         def CelsiusToFahrenheit(temperature):
             # Conversion formulae: Fahrenheit=(Celsius*1.8)+32
             result = (temperature*1.8)+32

             # return the converted temperature into Fahrenheit
             return result
```

```
In [25]: # call the function to use it with an argument
         value = CelsiusToFahrenheit(20)
         # print the returned value
         print("The Fahrenheit value is ", value, " degrees")
```

```
The Fahrenheit value is  68.0  degrees
```

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SUMMARY
THIS SESSION COVERED…

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- Example: Write a function to return the Fahrenheit value of a Celsius temperature number.
- Example 2: Write a Python function that compares two input Strings and returns a message indicating whether Strings are equal or not

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BIBLIOGRAPHY & REFERENCES

[1] P. Robbins, “Chapter 8: Functions and Modules,” in Python programming for beginners, P. Robbins Ed., UK, Amazon, ISBN:979-8376161821, 2023, pp.73-85.

[2] E. Matthes, “Chapter 8: Functions” in Python Crash Course: A hands-on, project-based introduction to programming, 2nd Edition, E. Matthes Ed., San Francisco, William Pollock No Starch Press Inc. 2019, pp.129-156.

[3] 365 Data Science, “Defining a function in Python,” 4, December 2020. [Online]. Available: https://www.youtube.com/watch?v=n9aDBOycsCY . [Accessed May 11, 2023].

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