Assignment-19.4

Task 1:

Write a Python function print_numbers() that prints the first 10 natural numbers using a loop.

Code and Output:

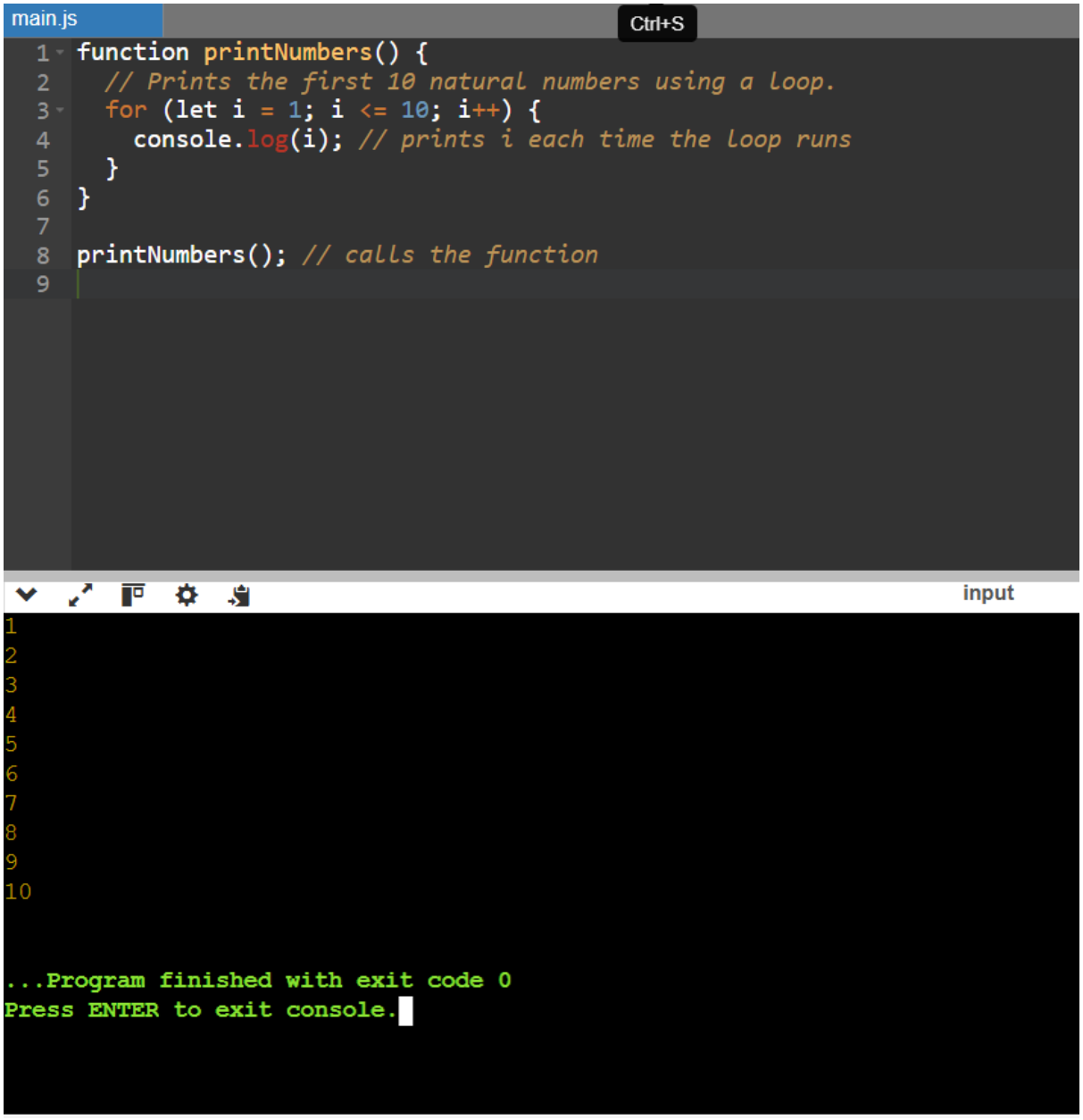
```
def print_numbers():
  """Prints the first 10 natural numbers using a loop."""
  for i in range(1, 11):
    print(i)

print_numbers()
```

```
1
2
3
4
5
6
7
8
9
10
```

Translate the function into JavaScript as a reusable function printNumbers().

Javascript:



Explanation:

explanation

Certainly! The code in cell `4e6a948d` is a Python function called `print_numbers()`.

Here's a breakdown:

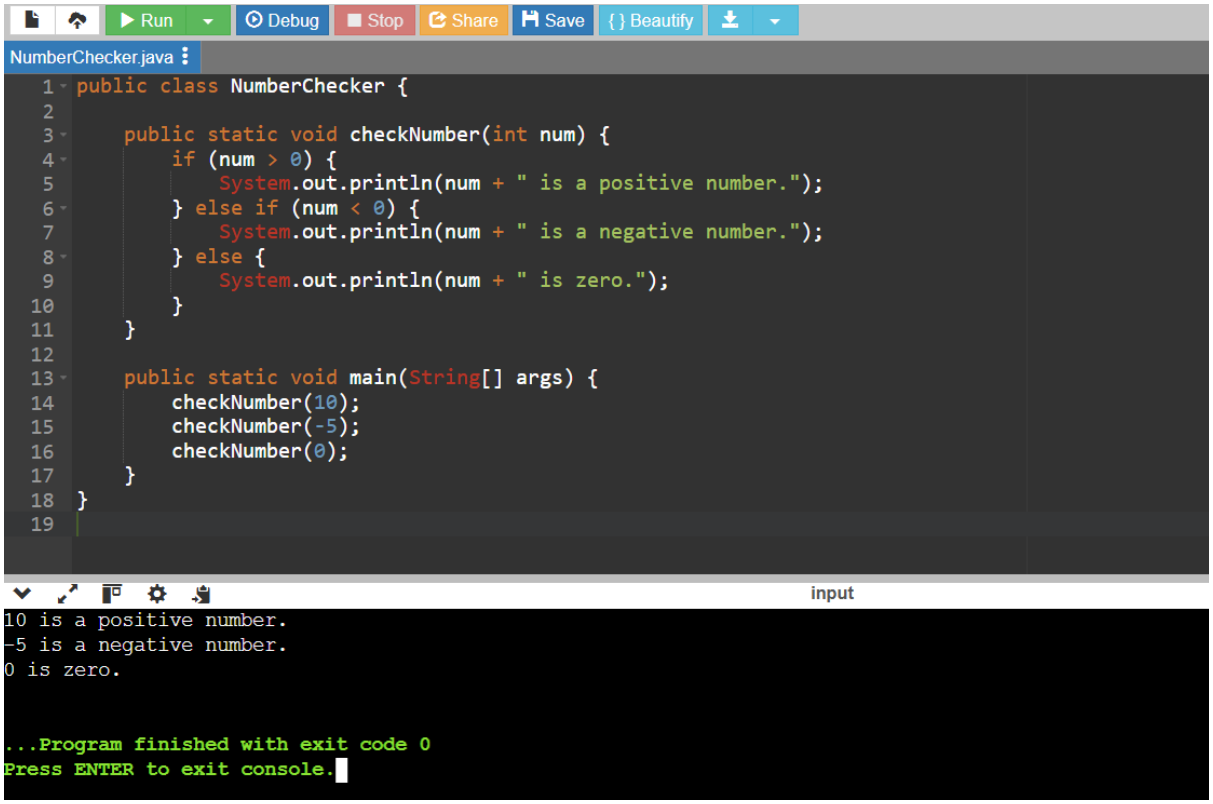
- `def print_numbers():` : This line defines a function named `print_numbers`. The code inside this function will only run when the function is called.
- `"""Prints the first 10 natural numbers using a loop."""` : This is a docstring, which explains what the function does.
- `for i in range(1, 11):` : This is a `for` loop.
  - `range(1, 11)` creates a sequence of numbers starting from 1 and going up to (but not including) 11. So, the sequence is 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
  - The loop will iterate through each number in this sequence, assigning the current number to the variable `i` in each iteration.
- `print(i)` : Inside the loop, this line prints the current value of `i` to the console.
- `print_numbers()` : This line calls the `print_numbers` function, which executes the code defined within it.

So, when the cell is run, the `print_numbers()` function is called, and the loop iterates from 1 to 10, printing each number on a new line.

Task 2:

Write a Java method checkNumber(int num) that checks if a number is positive, negative, or zero.

Java:



Translate the method into a Python function check_number(num).

Python:

```python
def check_number(num):
  """Checks if a number is positive, negative, or zero."""
  if num > 0:
    print(f"{num} is a positive number.")
  elif num < 0:
    print(f"{num} is a negative number.")
  else:
    print(f"{num} is zero.")

# Example usage:
check_number(10)
check_number(-5)
check_number(0)
```

```
10 is a positive number.
-5 is a negative number.
0 is zero.
```

+ Code + Text

Call the function/method with different inputs and compare outputs.

```python
def check_number(num):
  """Checks if a number is positive, negative, or zero."""
  if num > 0:
    print(f"{num} is a positive number.")
  elif num < 0:
    print(f"{num} is a negative number.")
  else:
    print(f"{num} is zero.")

# Example usage with various inputs:
check_number(10)
check_number(-5)
check_number(0)
check_number(100)
check_number(-99)
check_number(0.5)
check_number(-0.1)
```

```
10 is a positive number.
-5 is a negative number.
0 is zero.
100 is a positive number.
-99 is a negative number.
0.5 is a positive number.
-0.1 is a negative number.
```

Explanation:

Explanation

Certainly! The code in cell `a813674c` defines a Python function called `check_number(num)` and then demonstrates how to use it with various inputs.

Here's a breakdown:

- `def check_number(num):` : This line defines a function named `check_number` that takes one argument, `num`.
- `"""Checks if a number is positive, negative, or zero."""` : This is a docstring explaining the function's purpose.
- `if num > 0:` : This is the first condition. It checks if the number `num` is greater than 0. If it is, the code inside this `if` block is executed.
  - `print(f"{num} is a positive number.")` : This line prints a message indicating that the number is positive, using an f-string to include the value of `num` in the output.
- `elif num < 0:` : This is an "else if" condition. If the first `if` condition (`num > 0`) is false, this condition is checked. It checks if `num` is less than 0. If it is, the code inside this `elif` block is executed.
  - `print(f"{num} is a negative number.")` : This line prints a message indicating that the number is negative.
- `else:` : This is the final condition. If both the `if` and `elif` conditions are false (meaning `num` is neither greater than nor less than 0), the code inside this `else` block is executed.
  - `print(f"{num} is zero.")` : This line prints a message indicating that the number is zero.

The lines after the function definition are examples of how to call the `check_number` function with different values (10, -5, 0, 100, -99, 0.5, and -0.1). Each call passes a different number to the `num` parameter of the function, and the function then prints the corresponding output based on whether the number is positive, negative, or zero.

Task 3:

Write a Python function factorial(n) that calculates factorial of a number using recursion

Python:

```python
def factorial(n):
  """
  Calculates the factorial of a non-negative integer using recursion.

  Args:
    n: A non-negative integer.

  Returns:
    The factorial of n.
  """
  if n == 0:
    return 1
  else:
    return n * factorial(n-1)

# Example usage:
print(factorial(5))
print(factorial(0))
```

```
120
1
```

Translate the same into a C++ function int factorial(int n).

C++:

main.cpp

```cpp
#include <iostream>

int factorial(int n) {
    if (n < 0) {
        // Factorial is not defined for negative numbers
        return -1; // Or throw an exception
    }
    if (n == 0) {
        return 1;
    } else {
        return n * factorial(n - 1);
    }
}

int main() {
    std::cout << "Factorial of 5 is: " << factorial(5) << std::endl;
    std::cout << "Factorial of 0 is: " << factorial(0) << std::endl;
    std::cout << "Factorial of -1 is: " << factorial(-1) << std::endl; // Example with negative input
    return 0;
}
```

input

```
Factorial of 5 is: 120
Factorial of 0 is: 1
Factorial of -1 is: -1


...Program finished with exit code 0
Press ENTER to exit console.
```

Explanation:

explanation

Certainly! The code in cell `2c6a6df5` defines a Python function called `factorial(n)` that calculates the factorial of a non-negative integer using recursion.

Here's a breakdown:

- `def factorial(n):` : This line defines a function named `factorial` that takes one argument, `n`.
- `"""Calculates the factorial of a non-negative integer using recursion."""` : This is a docstring explaining the function's purpose.
- `if n == 0:` : This is the base case for the recursion. The factorial of 0 is defined as 1. When `n` is 0, the function stops calling itself and returns 1.
- `return 1` : If `n` is 0, the function returns the value 1.
- `else:` : If the base case is not met (i.e., `n` is not 0), the code inside the `else` block is executed.
- `return n * factorial(n-1)` : This is the recursive step. The factorial of `n` is calculated as `n` multiplied by the factorial of `n-1`. The function calls itself with `n-1` as the argument. This continues until the base case (`n == 0`) is reached.

The lines after the function definition are examples of how to call the `factorial` function with inputs 5 and 0, and the `print()` function displays the returned results.

In essence, the recursion works like this for `factorial(5)` : `factorial(5)` calls `factorial(4)` `factorial(4)` calls `factorial(3)` `factorial(3)` calls `factorial(2)` `factorial(2)` calls `factorial(1)` `factorial(1)` calls `factorial(0)` `factorial(0)` returns 1 (base case) `factorial(1)` receives 1 and returns 1 * 1 = 1 `factorial(2)` receives 1 and returns 2 * 1 = 2 `factorial(3)` receives 2 and returns 3 * 2 = 6 `factorial(4)` receives 6 and returns 4 * 6 = 24 `factorial(5)` receives 24 and returns 5 * 24 = 120

And for `factorial(0)` : `factorial(0)` reaches the base case and returns 1 immediately.

Task 4:

Write a JavaScript function printStudents(students) that takes an array of student names and prints each name.

Javascript:

main.js

```
function printStudents(students) {
  /**
   * Prints each student name from an array.
   * @param {string[]} students - An array of student names.
   */
  for (let i = 0; i < students.length; i++) {
    console.log(students[i]);
  }
}

// Example usage:
const studentNames = ["Alice", "Bob", "Charlie"];
printStudents(studentNames);
```

```
Alice
Bob
Charlie


...Program finished with exit code 0
Press ENTER to exit console.
```

Translate it into a Python function print_students(students) using a list.

Python:

```python
def print_students(students):
  """
  Prints each student name from a list.

  Args:
    students: A list of student names.
  """
  for student in students:
    print(student)

# Example usage:
student_names = ["Alice", "Bob", "Charlie"]
print_students(student_names)
```

```
Alice
Bob
Charlie
```

Explanation:

Explanation

Certainly! The code in cell `7140c818` defines a Python function called `print_students(students)` that iterates through a list of student names and prints each one.

Here's a breakdown:

- **`def print_students(students):`** : This line defines a function named `print_students` that takes one argument, `students`. This argument is expected to be a list.
- **`"""Prints each student name from a list."""`** : This is a docstring explaining the function's purpose.
- **`Args:`** and the following lines describe the arguments the function expects.
- **`for student in students:`** : This is a `for` loop, which is a common way to iterate through items in a list (or other iterable objects) in Python. In each iteration of the loop, the variable `student` will be assigned the next item from the `students` list.
- **`print(student)`** : Inside the loop, this line prints the current value of `student` (which is one of the names from the list) to the console.

The lines after the function definition demonstrate how to use the `print_students` function:

- **`student_names = ["Alice", "Bob", "Charlie", "David"]`** : This line creates a Python list named `student_names` containing four string elements (the student names).
- **`print_students(student_names)`** : This line calls the `print_students` function, passing the `student_names` list as the argument. The function then executes, printing each name in the list.

Task 5:

Write a **Python class** Car with attributes: brand, model, year.Add a **method** display_details() that prints car details.

Python:

```python
class Car:
  """Represents a car with brand, model, and year."""

  def __init__(self, brand, model, year):
    """Initializes the Car object with brand, model, and year."""
    self.brand = brand
    self.model = model
    self.year = year

  def display_details(self):
    """Prints the details of the car."""
    print(f"Brand: {self.brand}")
    print(f"Model: {self.model}")
    print(f"Year: {self.year}")

# Example usage:
my_car = Car("Toyota", "Corolla", 2020)
my_car.display_details()
```

```
Brand: Toyota
Model: Corolla
Year: 2020
```

Translate the same into a **Java class** Car with attributes and a **method** displayDetails().

Java:

Run | Debug | Stop | Share | Save | { } Beautify

Car.java

```java
public class Car {
    String brand;
    String model;
    int year;

    // Constructor
    public Car(String brand, String model, int year) {
        this.brand = brand;
        this.model = model;
        this.year = year;
    }

    // Method to display car details
    public void displayDetails() {
        System.out.println("Brand: " + brand);
        System.out.println("Model: " + model);
        System.out.println("Year: " + year);
    }

    // Main method for example usage
    public static void main(String[] args) {
        // Create a Car object
        Car myCar = new Car("Toyota", "corolla", 2020);

        // Display details of the car
        myCar.displayDetails();
    }
}
```

input

```
Model: corolla
Year: 2020


...Program finished with exit code 0
Press ENTER to exit console.
```

Explanation:

Explanation

Certainly! The code in cell `5d9d9b53` defines a Python class called `Car` and demonstrates how to create an object (or instance) of that class and use its method.

Here's a breakdown:

- **`class Car:`** : This line defines a new class named `Car`. Classes serve as blueprints for creating objects.
- **`"""Represents a car with brand, model, and year."""`** : This is a docstring explaining the purpose of the class.
- **`def __init__(self, brand, model, year):`** : This is a special method called the constructor. It's automatically called when you create a new `Car` object.
  - `self` refers to the instance of the class being created.
  - `brand`, `model`, and `year` are parameters that you pass when creating a `Car` object.
  - **`self.brand = brand`**, **`self.model = model`**, **`self.year = year`** : These lines assign the values passed as arguments to the corresponding attributes of the `Car` object. These attributes (`brand`, `model`, `year`) store the data for each specific car object.
- **`def display_details(self):`** : This defines a method called `display_details` within the `Car` class. Methods are functions that belong to a class and operate on the objects of that class.
  - `self` is required as the first parameter in instance methods and refers to the object the method is being called on.
  - **`print(f"Brand: {self.brand}")`**, **`print(f"Model: {self.model}")`**, **`print(f"Year: {self.year}")`** : These lines print the values of the `brand`, `model`, and `year` attributes of the specific `Car` object that `display_details()` is called on.

The lines after the class definition show how to use the `Car` class:

- **`my_car = Car("Toyota", "Camry", 2022)`** : This line creates a new object (an instance) of the `Car` class. It calls the `__init__` constructor, passing "Toyota", "Camry", and 2022 as arguments for `brand`, `model`, and `year` respectively. The created object is assigned to the variable `my_car`.
- **`my_car.display_details()`** : This line calls the `display_details()` method on the `my_car` object. This executes the code within the `display_details` method for the `my_car` object, printing its specific brand, model, and year.