A. Data Types in Python:

01. Integer (“int”)

An integer represents whole numbers, positive or negative, without any decimal points.

```
# Example of an integer
my_integer = 42
print(my_integer)
# Output: 42
```

02. Float (“float”)

A float represents floating-point numbers, which include decimal points.

```
# Example of a floating-point number
my_float = 3.14
print(my_float)
# Output: 3.14
```

03. String (“str”)

Strings represent sequences of characters, enclosed in either single quotes (' ') or double quotes (" ").

```
# Example of a string
my_string = "Hello, Python!"
print(my_string)
# Output: Hello, Python!
```

04. List

Lists are ordered collections of items that are mutable (can be changed).

```
# Example of a list
my_list = [1, 2, 3, 'a', 'b', 'c']
print(my_list)
# Output: [1, 2, 3, 'a', 'b', 'c']
```

05. Tuple

Tuples are ordered collections similar to lists, but they are immutable (cannot be changed).

```
# Example of a tuple
my_tuple = (4, 5, 'x', 'y')
print(my_tuple)
# Output: (4, 5, 'x', 'y')
```

06. Dictionary (“dict”)

Dictionaries are collections of key-value pairs.

```
# Example of a dictionary
my_dict = {'name': 'Alice', 'age': 30, 'city': 'New York'}
print(my_dict)
# Output: {'name': 'Alice', 'age': 30, 'city': 'New York'}
```

7. **Boolean ("bool")**
   Booleans represent truth values, either True or False.
   # Example of a boolean
   my_boolean = True
   print(my_boolean)
   # Output: True

8. **Set**
   Sets are unordered collections of unique elements.

   # Example of a set
   my_set = {1, 2, 3, 4, 4, 3, 2} # Note: Duplicates are automatically removed in a set
   print(my_set)
   # Output: {1, 2, 3, 4}

9. **NoneType ("None")**
   None represents the absence of a value.

   # Example of NoneType
   my_none = None
   print(my_none)
   # Output: None

These are some of the fundamental data types in Python. Each type serves its purpose in different scenarios and allows for flexible and versatile programming.

Program 01_Python data type:

```
# Integer data type
my_integer = 42
print("Integer data type:", my_integer)

# Float data type
my_float = 3.14
print("Float data type:", my_float)

# String data type
my_string = "Hello, Python!"
print("String data type:", my_string)

# List data type
my_list = [1, 2, 3, 'a', 'b', 'c']
print("List data type:", my_list)

# Tuple data type
my_tuple = (4, 5, 'x', 'y')
print("Tuple data type:", my_tuple)
```

```python
# Dictionary data type
my_dict = {'name': 'Alice', 'age': 30, 'city': 'New York'}
print("Dictionary data type:", my_dict)

# Boolean data type
my_boolean = True
print("Boolean data type:", my_boolean)

# Set data type
my_set = {1, 2, 3, 4, 4, 3, 2}  # Duplicates are automatically removed in a set
print("Set data type:", my_set)

# NoneType data type
my_none = None
print("NoneType data type:", my_none)
```

Output:

```
Integer data type: 42
Float data type: 3.14
String data type: Hello, Python!
List data type: [1, 2, 3, 'a', 'b', 'c']
Tuple data type: (4, 5, 'x', 'y')
Dictionary data type: {'name': 'Alice', 'age': 30, 'city': 'New York'}
Boolean data type: True
Set data type: {1, 2, 3, 4}
NoneType data type: None
```

Program 2.1_Python Program for Area of Triangle:

```python
# Python Program for Area of Triangle:
b = float(input('Enter the base: '))
h= float(input('Enter the height: '))

# calhculate the area
area = 1/2*b*h
print('The area of the triangle is %0.2f' % area)
```

Output:

```
Enter the base: 10
Enter the height: 5
The area of the triangle is 25.00
```

Program 2.2_Python Program for Area of Triangle:

```
def calculate_triangle_area(base, height):
    # Area of a triangle formula: area = 0.5 * base * height
    area = 0.5 * base * height
    return area

# Example values for base and height
base_length = 8
height_length = 5

# Calculating the area of the triangle
triangle_area = calculate_triangle_area(base_length, height_length)

# Displaying the result
print(f"The area of the triangle with base {base_length} and height
{height_length} is: {triangle_area}")
```

Output:

```
The area of the triangle with base 8 and height 5 is: 20.0
```

- The f at the beginning of the print statement is a prefix indicating an f-string in Python. It stands for "formatted string."
- In Python, an f-string is a string literal that has an f at the beginning and curly braces { } containing expressions that will be replaced with their values when the string is formatted. It allows for easy string interpolation, allowing variables and expressions to be directly embedded within the string.

Program 2.3_Python Program for Area of Triangle:

```
def calculate_triangle_area(base, height):
    # Area of a triangle formula: area = 0.5 * base * height
    area = 0.5 * base * height
    return area

# Accepting user input for base and height
base_length = float(input("Enter the base length of the triangle: "))
height_length = float(input("Enter the height of the triangle: "))

# Calculating the area of the triangle
triangle_area = calculate_triangle_area(base_length, height_length)

# Displaying the result
print(f"The area of the triangle with base {base_length} and height
{height_length} is: {triangle_area}")
```

Output:

```
Enter the base length of the triangle: 10
Enter the height of the triangle: 5
The area of the triangle with base 10.0 and height 5.0 is: 25.0
```

Program 2.4_HTML_Java Script Program for Area of Triangle:

```
<!DOCTYPE html>
<html>
<head>
    <title>Triangle Area Calculator</title>
</head>
<body bgcolor=yellow>
    <h1>Triangle Area Calculator</h1>

    <label for="base">Enter Base of the Triangle:</label></br></br>
    <input type="number" id="base"></br></br>

    <label for="height">Enter Height of the Triangle:</label></br></br>
    <input type="number" id="height"></br></br>

    <button onclick="calculateArea()">Calculate Area</button>

    <p id="result"></p>

    <script>
        function calculateArea() {
            // Get base and height values from user input
            var base = parseFloat(document.getElementById('base').value);
            var height = parseFloat(document.getElementById('height').value);

            // Calculate the area of the triangle
            var area = 0.5 * base * height;

            // Display the result
            document.getElementById('result').innerText = "The area of the
triangle is: " + area;
        }
    </script>
</body>
</html>
```

Output:

Program 3.1_Arithmetic Operations in python:

```
# Define two numbers
num1 = 20
num2 = 7

# Addition
addition = num1 + num2
print(f"Addition: {num1} + {num2} = {addition}")

# Subtraction
subtraction = num1 - num2
print(f"Subtraction: {num1} - {num2} = {subtraction}")

# Multiplication
multiplication = num1 * num2
print(f"Multiplication: {num1} * {num2} = {multiplication}")

# Division
division = num1 / num2
print(f"Division: {num1} / {num2} = {division}")

# Modulo (Remainder)
modulo = num1 % num2
print(f"Modulo: {num1} % {num2} = {modulo}")
```

Output:

```
Addition: 20 + 7 = 27
Subtraction: 20 - 7 = 13
Multiplication: 20 * 7 = 140
Division: 20 / 7 = 2.857142857142857
Modulo: 20 % 7 = 6
```

Program 3.2_Arithmetic Operations in python:

```python
# Function to perform arithmetic operations
def perform_arithmetic_operations(num1, num2):
    addition = num1 + num2
    subtraction = num1 - num2
    multiplication = num1 * num2
    division = num1 / num2
    modulo = num1 % num2

    # Displaying the results
    print(f"Addition: {num1} + {num2} = {addition}")
    print(f"Subtraction: {num1} - {num2} = {subtraction}")
    print(f"Multiplication: {num1} * {num2} = {multiplication}")
    print(f"Division: {num1} / {num2} = {division}")
    print(f"Modulo: {num1} % {num2} = {modulo}")

# Accepting input from the user
num1 = float(input("Enter the first number: "))
num2 = float(input("Enter the second number: "))

# Calling the function to perform arithmetic operations
perform_arithmetic_operations(num1, num2)
```

Output:

```
Enter the first number: 21
Enter the second number: 11
Addition: 21.0 + 11.0 = 32.0
Subtraction: 21.0 - 11.0 = 10.0
Multiplication: 21.0 * 11.0 = 231.0
Division: 21.0 / 11.0 = 1.9090909090909092
Modulo: 21.0 % 11.0 = 10.0
```

- **This program defines a function perform_arithmetic_operations that takes two numbers as input arguments and performs addition, subtraction, multiplication, division, and modulo operations on those numbers.**
- **The user is prompted to input two numbers, which are then used as arguments to the function to perform arithmetic operations on them.**
- **The float() function is used to convert the user input into floating-point numbers for accurate arithmetic calculations.**

Program 3.3_Arithmetic Operations in python:

```
# Store input numbers:
num1 = input('Enter first number: ')
num2 = input('Enter second number: ')

# Add two numbers
sum = float(num1) + float(num2)

# Subtract two numbers
min = float(num1) - float(num2)

# Multiply two numbers
mul = float(num1) * float(num2)

# Divide two numbers
div = float(num1) / float(num2)

# Display the sum
print('The sum of {0} and {1} is {2}'.format(num1, num2, sum))

# Display the subtraction
print('The subtraction of {0} and {1} is {2}'.format(num1, num2, min))

# Display the multiplication
print('The multiplication of {0} and {1} is {2}'.format(num1, num2, mul))

# Display the division
print('The division of {0} and {1} is {2}'.format(num1, num2, div))
```

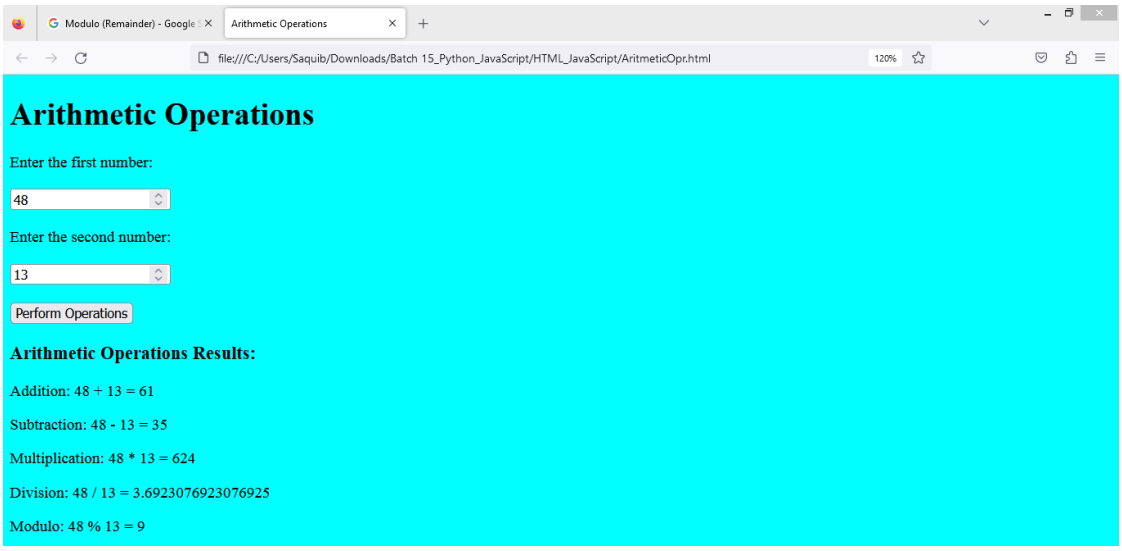
Output:

```
Enter first number: 20
Enter second number: 10
The sum of 20 and 10 is 30.0
The subtraction of 20 and 10 is 10.0
The multiplication of 20 and 10 is 200.0
The division of 20 and 10 is 2.0
```

Program 3.4_Arithmetic Operations in Html_Javascript:

```
<!DOCTYPE html>
<html>
<head>
    <title>Arithmetic Operations</title>
</head>
<body bgcolor= cyan>
    <h1>Arithmetic Operations</h1>

    <label for="num1">Enter the first number:</label><br/><br/>
    <input type="number" id="num1"><br/><br/>

    <label for="num2">Enter the second number:</label><br/><br/>
    <input type="number" id="num2"><br/><br/>

    <button onclick="performOperations()">Perform Operations</button>

    <div id="results"></div>

    <script>
        function performOperations()
    {
            var num1 = parseFloat(document.getElementById('num1').value);
            var num2 = parseFloat(document.getElementById('num2').value);

            var addition = num1 + num2;
            var subtraction = num1 - num2;
            var multiplication = num1 * num2;
            var division = num1 / num2;
            var modulo = num1 % num2;

            var results = document.getElementById('results');
            results.innerHTML = "<h3>Arithmetic Operations Results:</h3>" +
                "<p>Addition: " + num1 + " + " + num2 + " = " + addition +
"</p>" +
                "<p>Subtraction: " + num1 + " - " + num2 + " = " + subtraction
+ "</p>" +
                "<p>Multiplication: " + num1 + " * " + num2 + " = " +
multiplication + "</p>" +
                "<p>Division: " + num1 + " / " + num2 + " = " + division +
"</p>" +
                "<p>Modulo: " + num1 + " % " + num2 + " = " + modulo + "</p>";
        }
    </script>
</body>
</html>
```

Output:



Program 4.1_Python program to swap two variables:

```
# Initial values of two variables
variable1 = 5
variable2 = 10

print("Before swapping:")
print("variable1 =", variable1)
print("variable2 =", variable2)

# Swapping the values using a third variable
temp = variable1
variable1 = variable2
variable2 = temp

print("\nAfter swapping:")
print("variable1 =", variable1)
print("variable2 =", variable2)
```

Output:

```
Before swapping:
variable1 = 5
variable2 = 10

After swapping:
variable1 = 10
variable2 = 5
```

This Python program demonstrates how to swap the values of two variables (variable1 and variable2). It uses a third variable temp to temporarily hold one of the values during the swapping process. After the values are interchanged, the new values of the variables are printed to display the swapping results.

Program 4.2_Python program to swap two variables:

```
# Accepting input from the user
variable1 = input("Enter the value for variable 1: ")
variable2 = input("Enter the value for variable 2: ")

print("\nBefore swapping:")
print("variable1 =", variable1)
print("variable2 =", variable2)

# Swapping the values without using a third variable
variable1, variable2 = variable2, variable1

print("\nAfter swapping:")
print("variable1 =", variable1)
print("variable2 =", variable2)
```

Output:

```
Enter the value for variable 1: 45
Enter the value for variable 2: 90

Before swapping:
variable1 = 45
variable2 = 90

After swapping:
variable1 = 90
variable2 = 45
```

Program 4.3_HTML_JavaScript program to swap two variables:

```
<!DOCTYPE html>
<html>
<head>
    <title>Variable Swapping</title>
</head>
<body bgcolor=orange>
    <h1>Variable Swapping</h1>

    <label for="variable1">Enter value for variable 1:</label></br></br>
    <input type="text" id="variable1"></br></br>

    <label for="variable2">Enter value for variable 2:</label></br></br>
    <input type="text" id="variable2"></br></br>

    <button onclick="swapVariables()">Swap Variables</button></br></br>

    <p>Before Swapping:</p>
    <p id="beforeSwap"></p>
```

```
    <p>After Swapping:</p>
    <p id="afterSwap"></p>

    <script>
        function swapVariables() {
            var var1 = document.getElementById('variable1').value;
            var var2 = document.getElementById('variable2').value;

            // Display values before swapping
            document.getElementById('beforeSwap').innerText = "Variable 1: " + var1 + ",
Variable 2: " + var2;

            // Swapping the variables using destructuring assignment
            [var1, var2] = [var2, var1];

            // Display values after swapping
            document.getElementById('afterSwap').innerText = "Variable 1: " + var1 + ",
Variable 2: " + var2;
        }
    </script>
</body>
</html>
```

Output:

This HTML file includes a simple form where users can input values for two variables. Upon clicking the "Swap Variables" button, the swapVariables JavaScript function is triggered. This function retrieves the values entered by the user and then swaps the variables using destructuring assignment. The values before and after swapping are displayed in the HTML elements with the IDs beforeSwap and afterSwap, respectively.

Program 5.1_ Python Program to check if a Number is odd or even:

Odd and Even numbers:
If you divide a number by 2 and it gives a remainder of 0 then it is known as even number, otherwise an odd number.
Even number examples: 2, 4, 6, 8, 10, etc.
Odd number examples: 1, 3, 5, 7, 9 etc.

```
num = int(input("Enter a number: "))
if (num % 2) == 0:
   print("{0} is Even number".format(num))
else:
   print("{0} is Odd number".format(num))
```

Output:
Enter a number: 10
10 is Even number

Enter a number: 11
11 is Odd number

In this program:

- **The user is prompted to input a number.**
- **The program checks if the entered number is divisible by 2 using the modulo operator (%).**
- **If the remainder is 0, it prints that the number is even; otherwise, it prints that the number is odd.**

Program 5.2_ Python Program to check if a Number is odd or even_Functions:

```
# Function to check if a number is odd or even
def check_odd_even(number):
    if number % 2 == 0:
        print(f"{number} is an even number.")
    else:
        print(f"{number} is an odd number.")

# Accepting input from the user
num = int(input("Enter a number: "))

# Calling the function to check odd or even
check_odd_even(num)
```

Output:
Enter a number: 10
10 is an even number.

Enter a number: 11
11 is an odd number.

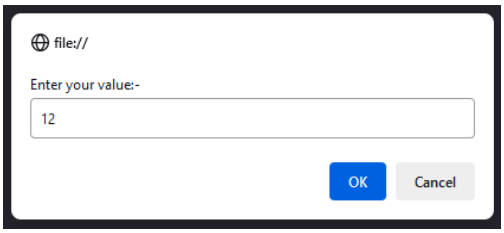
In this program:

- **The check_odd_even function takes a number as an argument and uses the modulo operator (%) to check if the number is divisible by 2.**
- **If the remainder is 0, it prints that the number is even; otherwise, it prints that the number is odd.**
- **The user is prompted to input a number, and the program calls the check_odd_even function to determine and print whether the entered number is odd or even.**

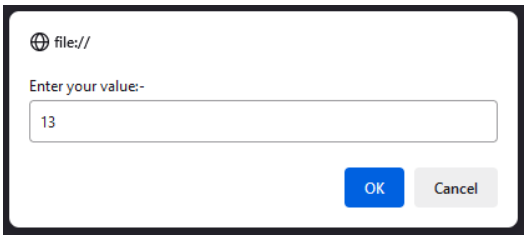
Program 5.3_ HTML_JavaScript program to check if a Number is odd or even:

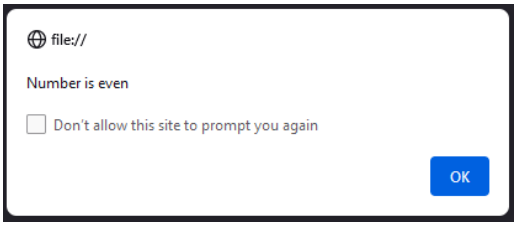
```
<!DOCTYPE html>
<html>
<head><title>Even  Odd</title></head>
<body  bgcolor="green">
    <h1> Program to check number is even or odd </h1>
    <script  type="text/Javascript">
        var a,b;
        a=prompt("Enter your value:-");
        b=parseInt(a) ;
        // input is converted into number data type
        if(b%2==0)
            alert("Number is even");
         else
            alert("Number is odd");
    </script>
</body>
</html>
```

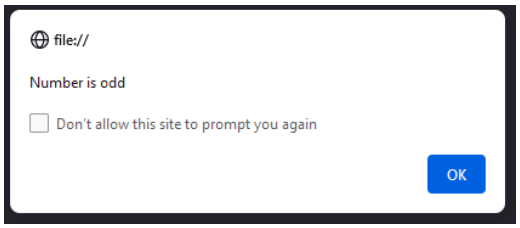
Output:



OR







Program 5.4_ HTML_JavaScript program to check if a Number is odd or even:

```
<!DOCTYPE html>
<html>
<head>
    <title>Odd or Even Checker</title>
</head>
<body bgcolor=yellow>
    <h1>Odd or Even Checker</h1>

    <label for="number">Enter a number:</label>
    <input type="number" id="number"><br/><br/>

    <button onclick="checkOddEven()">Check Odd/Even</button>

    <p id="result"></p>

    <script>
        function checkOddEven()
      {
            var num = parseInt(document.getElementById('number').value);

            if (num % 2 === 0)
            {
                document.getElementById('result').innerText = num + " is an even number.";
            }
            else
           {
                document.getElementById('result').innerText = num + " is an odd number.";
            }
        }
    </script>
</body>
</html>
```

Output: