COMPLEX DATA TYPE

In Python, the complex type is used to represent complex numbers, which consist of a real and an imaginary part. You can create complex numbers and perform mathematical operations on them using the built-in support for complex numbers. Creating a Complex Number A complex number is created by appending the letter j (or J) to the imaginary part. The format is: z = real + imaginary *1j ex. z = 3+4j Here, 3 is the real part, and 4j is the imaginary part.

```
In [12]:  z = 3 + 4j      # Here, 3 is the real part, and 4j is the imaginary part.
          print(z.real)
          print(z.imag)  # We can access the real and imaginary parts of a complex number
```

```
3.0
4.0
```

```
In [48]:  # ARITHMETIC FUNCTIONS

          a = 3 + 4j
          b = 1 + 2j

          # Addition   (4+6j)
          print(a+b)

          # Subtraction   (2+2j)
          print(a-b)

          # Multiplication   (-5+10j)
          print(a*b)

          # Division   (2.2-0.4j)
          print(a/b)
```

```
(4+6j)
(2+2j)
(-5+10j)
(2.2-0.4j)
```

Using Built-in Functions

Python provides several functions to work with complex numbers, such as:

1. abs(z): Returns the magnitude (absolute value) of the complex number.
2. conjugate(z): Returns the complex conjugate of the number.

```
In [30]:  z = 3 + 4j
          print(abs(z))    #5.0 (Magnitude)
          print(z.conjugate()) #(3-4j) (Complex conjugate)
```

```
5.0
(3-4j)
```

Complex Number in the cmath Module

The cmath module provides additional functionality for complex numbers, such as trigonometric functions, logarithms, and square roots.

In [46]:
```python
import cmath

z = 1 + 1j

#getting the phase (angle) of the complex number
print(cmath.phase(z))        # 0.7853981633974483 (radians)

#getting the polar form of the complex number (magnitude, angle)
print(cmath.polar(z))        # (1.4142135623730951, 0.7853981633974483)

#getting the square root of the complex number
print(cmath.sqrt(z))         # (1.09868411346781+0.45508986056222733j)
```

```
0.7853981633974483
(1.4142135623730951, 0.7853981633974483)
(1.09868411346781+0.45508986056222733j)
```

Conclusion

- Complex numbers are written with j or J for the imaginary part.
- You can perform basic arithmetic operations on complex numbers.
- You can access the real and imaginary parts using .real and .imag.
- The cmath module offers additional functions for complex numbers.

In [ ]: