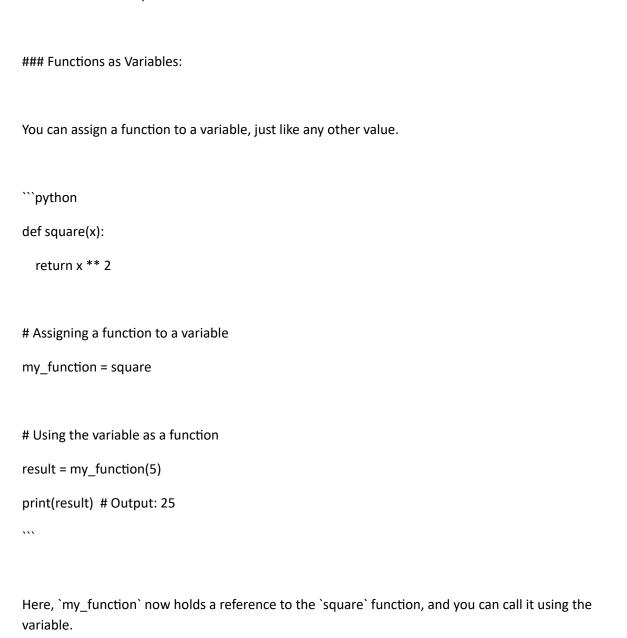
Functions- first class citizens

In Python, functions are considered first-class citizens. This means that functions can be treated like any other data type, such as integers, strings, or lists. They can be passed as arguments to other functions, returned as values from other functions, and assigned to variables. This concept is fundamental to functional programming and allows for a high degree of flexibility in Python programming. Here's an overview with examples:



```
### Functions as Arguments:
You can pass functions as arguments to other functions.
```python
def apply_operation(func, x):
 return func(x)
Passing a function as an argument
result = apply_operation(square, 4)
print(result) # Output: 16
The 'apply_operation' function takes another function ('func') and applies it to a given value ('x').
Functions as Return Values:
Functions can also return other functions.
```python
def get_power_function(exponent):
  def power(x):
    return x ** exponent
  return power
```

```
# Returning a function from another function
square_function = get_power_function(2)
result = square_function(3)
print(result) # Output: 9
Here, 'get_power_function' returns a new function ('power') that raises its argument to the specified
exponent.
### Functions in Data Structures:
Functions can be stored in data structures like lists or dictionaries.
```python
def add(x, y):
 return x + y
def subtract(x, y):
 return x - y
Storing functions in a list
operations = [add, subtract]
Using functions from the list
result1 = operations[0](5, 3)
result2 = operations[1](8, 4)
```

```
print(result1) # Output: 8
print(result2) # Output: 4
Here, the 'operations' list contains references to the 'add' and 'subtract' functions, and you can call
them by indexing into the list.
Functions as Parameters to Higher-Order Functions:
A higher-order function is a function that takes one or more functions as arguments or returns a function
as its result.
```python
def apply_operation(func, x, y):
  return func(x, y)
# Using a higher-order function
result = apply_operation(add, 5, 3)
print(result) # Output: 8
```

Here, `apply_operation` is a higher-order function that takes an operation function ('add' in this case)

In summary, the concept of functions as first-class citizens in Python allows for more dynamic and expressive coding patterns. It enables the creation of higher-order functions, facilitates functional

and applies it to two arguments.